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Founder and Editor : STANLEY SPOONER.

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EDITORIAL COMMENT.

The Royal Aircraft Factory and the Industry. For many months past a campaign of criticism has been directed from certain quarters against the Royal Aircraft Factory, alleging that the policy of the Factory is one deliberately calculated to undermine the private constructor and to ruin an industry which, it must be frankly confessed, is by no means through the trials of its infancy. We have received from Messrs. Hewlett and Blondeau a letter, published elsewhere in our correspondence columns, which appears to us to open up the whole question of the charges which have been made against the R.A.F., and to present the matter in a most serious light. We will not reiterate at the moment the charges that have been made—we shall deal with them later in some detail—but this must be said at once, that if those charges can be proved to be true, then the future of the industry is utterly hopeless and the sooner it is realised by the private constructors as a body the better, and the sooner they abandon a futile enterprise the less money they will lose. Always provided, of course, that these charges are proved.

The reason is not far to seek. Apart from the hopelessness of any attempt by existing firms to continue, it is obviously futile to expect that capitalists will come forward with money to invest in aviation if it is only to provide ideas to be filched by the R.A.F. But is this so, and can the charges be substantiated? Let us see.

The matter is so serious a one that we have thought it worth while to investigate the facts as far as they are available, and as to whether we have met with any measure of success, we will leave our readers to judge. The gravest allegation made against the Factory is, as we have indicated, that it is an open and unashamed pirate of other people's ideas, and that the machines of the B.E. type, which have emanated from Farnborough, consist in great part of the embodiment of that which is best in a number of privately designed machines. We are entirely without bias or prejudice in the matter of the R.A.F., unless it be prejudice to hold the belief, expressed by us in FLIGHT over and over again, that the Factory ought by no means to be in any way a competitor of the private constructor, and that its efforts should be strictly confined to the work it was officially stated was to be its particular province—mainly experimental. We will go further than this and say that we are most strongly of opinion that the R.A.F. ought not to build machines at all for the Army or the Navy, save and except under pressure of unavoidable causes, such as the inability of private firms to deliver in sufficient numbers, or time, the machines which are essential to the scheme of national defence. This last is a very necessary reservation, because while we are all for the fostering of the private industry, it would be blind foolishness to stand still in the matter of our equipment if we can get the machines that are necessary from any source at all, public or private. With this preliminary and necessary statement of our attitude in the matter, we will endeavour now to get down to bed-rock facts, with a view to finding out just what justification there is for the statements which have been made with regard to the policy of the R.A.F.

First, as to the charge that the Factory is a copyist and nothing else. Supposing that the charge were true—which is not admitted at the moment—we should not be inclined to attach too much blame to the officials for that, so long as the work they were carrying out was of an experimental nature. Until the perfect aeroplane is evolved, it is beyond question that one of the most open lines of progress lies along that of taking the best features of the best designs and embodying them in new machines of a modified type. This, however, is not the charge which is laid at the door of the R.A.F. The allegation is a more serious one than that, and amounts to the statement that the best features of privately designed machines have been stolen—it is a strong word, but justifiable under the circumstances—and embodied in machines being built for the Services,

to the vast detriment of the private industry which has thereby been robbed of the orders which were due to it. This subject is one that is more of a technical than an editorial one, and we have therefore thought it best to treat it separately in an article which appears on another page of this issue of FLIGHT. In the compilation of this article we have approached the subject entirely from an uncritical standpoint, and without any attempt to prove or disprove that the design of the B.E. machines is either good, indifferent, or frankly bad. It does not concern us in the least, for the purposes of this article, under which category the design falls—the main thing is to deal with the question of whether or not the charge of picking the brains of others, in connection with the B.E., has a solid foundation of fact, or is merely the creation of irresponsible critics. With that we will leave it for the student to examine the facts set out in the article referred to, except that we have this to say in addition, that we will welcome from any of our readers anything in the shape of reasoned criticism which will throw proper light on this important matter. It must be understood, however, that all criticism must be of fact and be of an absolutely definite nature giving the dates and data on which it is founded, and not in general terms. Such legitimate criticism as falls within the lines we have indicated, we undertake shall find a place in the columns of FLIGHT. We feel very strongly that this is a matter that must be definitely cleared up, once and for all, as irrespective of justice to the R.A.F., a principle is involved which is striking direct at the heart of encouragement for the industry.

We would ask our readers to give careful study to the article on the technical aspects of this copying side of the issue, which, unless we are totally wrong in our facts—which we submit is not the case, since they have been most carefully and independently collated—constitutes a refutation of the charges to which reference has already been made.

It further emerges from the letter of Messrs. Hewlett and Blondeau that there is apparently something gravely wrong with the inner working of the firms which constitute the aviation industry of this country. One of the main charges against the R.A.F. is that it is building in direct opposition to all statements that have been made as to its real functions, and is working untold harm to the private constructor, who cannot obtain orders in consequence of the direct breach of faith and understanding involved. How much truth is there in these assertions?

The experience of our correspondents, at any rate, seems to imply that the R.A.F. is only too willing to encourage the private constructor. The question then arises, if that is so, why is the Factory at present engaged on the construction of a larger number of B.E. machines than has yet been given out on any one tender? Why is it that the Factory is working day and night shifts, and that no expense is being spared to deliver these machines by March. That, on the face of it, would almost seem to confirm the allegations that the Factory is, in fact, building against the private firms. We have reason to believe that the Factory has been forced into doing this, because of the impossibility of obtaining a sufficient number of machines from private firms. We are informed, altogether independent of official sources, that the machines tendered for and ordered from private firms have been delivered reasonably to time, but that an extraordinary number have been rejected either for failing to comply with the specification, or for not reaching the necessary standard of constructional excellence. There might conceivably be an answer to this, which would be to the effect that the

R.A.F. officials, in order to serve their own ends, set up a fictitious standard of their own in order deliberately to reject machines which are up to all reasonable requirements of the Service. But in the light of the statements made in Messrs. Hewlett and Blondeau's letter, which are to the effect that they at least have no complaint in this respect, such an answer cannot be entertained for a moment. Thus we are driven back upon the explanation that, for one reason and another, the needs of the Services cannot be met by the private firms, and the factory is compelled to fill the *hiatus*. On this point again we shall welcome any authenticated facts and criticisms which our readers may have to offer, with the same reservation as we have insisted upon in the matter of the technical side of the question—that what we require are facts and their foundations, not general statements of the loosest possible nature, such as have been flying about for too long.

Now we come to another most serious aspect of this serious question. In their letter to us, Messrs. Hewlett and Blondeau say that the larger firms are accepting Government orders at a price which must entail dead loss, with the apparent object of killing the smaller concerns out of hand. We frankly confess that we do not know exactly how much there is in this assertion, which is an entirely *ex parte* one, as our readers can see for themselves. But, assuming that Messrs. Hewlett and Blondeau know whereof they are talking, can it be that there is any connection between this and the high percentage of rejections which take place, and which, according to our information, has forced the R.A.F. into a building policy which is foreign to its real functions? On the face of it, there would seem to be something in this theory.

Now, if that is so, then it is certainly time for the trade to set its house in order on the lines indicated by the letter to which we have referred. The point which seems to emerge is that our fighting Services must have the best machines and nothing but the best. We cannot afford to give them anything less and that for very manifest reasons. It is one of the functions of the R.A.F. to see that nothing but the best in design, in material, and in construction is passed into the Service and we would rather see error on the side of too stringent an interpretation of the essentials than the slightest leaning towards laxity of inspection. Then comes the point that if the private constructor cannot afford to give of his best for the price he quotes, he must quote higher and abandon the policy which is alleged against him, that he is engaged in a game of "cut-throat" with his competitors. Let it be clear that the allegation is not of ours, but is made by a firm of constructors who should know their facts, and thus, until their statements have been disproved by facts and figures, we are bound to accept them as being a fair index to the state of things existing. In such a case as this the country not only can and should pay, and we are quite satisfied that they will be prepared to pay a reasonable price. We earnestly trust that, for the future good of the industry and of the whole aviation movement, an effort will be made to assist us in the clearing up of a situation which, from all and every point of view, has reached a stage at which it is well-nigh intolerable.

We have no desire in the world to accept the rôle of apologists for the R.A.F. Indeed, beyond so far as they are a Government Experimental Department, our sympathies are all the other way, but it does seem to us that in the interests of all parties, and in order that casual and irresponsible criticism may be silenced, the whole tangled skein should be unravelled without a moment's more delay than is necessary.

JANUARY 31, 1914.

FLIGHT

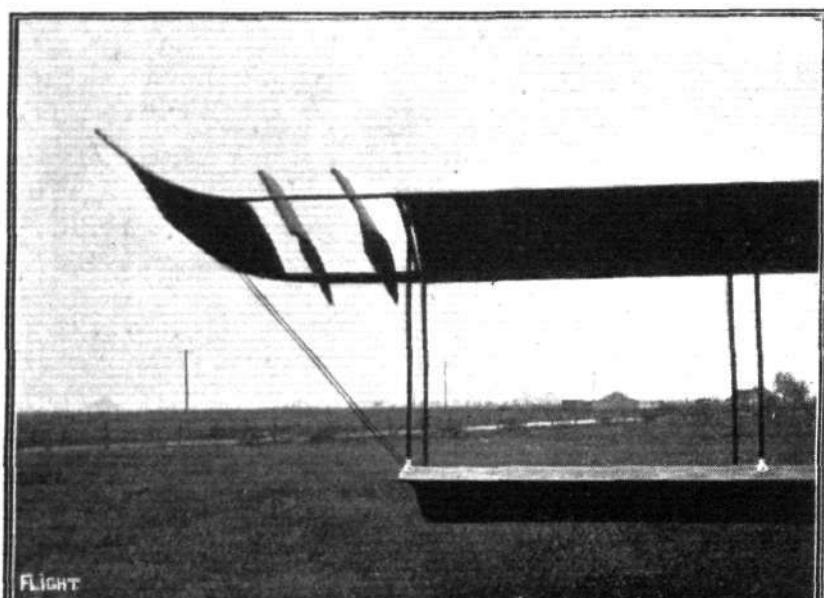
MEN OF MOMENT IN THE WORLD OF FLIGHT.



MR. DUKINFIELD JONES.

SOME EXPERIMENTS WITH DIFFERENT SYSTEMS OF LATERAL CONTROL.

Mr. W. E. SOMERVILLE, of Coal City, Illinois, U.S.A., sends us the following interesting account of some experiments with different systems of lateral control,



THE SOMERVILLE BIPLANE.—Type 1 Aileron fitted on 1910 experimental biplane, and also used in 1911.

which he has carried out during the years 1910, 1911, 1912 and 1913, in order to determine the best form of *ailerons* :—

"Machines Nos. 1, 2 and 3, as shown in the accompanying photographs, all had shutters, which were not interconnected, and which were operated by opening the shutters on the higher wing, thereby partly reducing the area and consequently the lift, whilst the added resistance caused a drag, which retarded the speed of the higher wing tip.

Ailerons also proved to be quite good as a rudder, in fact while the experiments were being carried out the rudder was very seldom used. However, as the shutters were kept closed by means of a heavy spring the action of opening them against the pull of the spring entailed some rather hard work, so this system was discarded.

"System No. 3 was fairly good, but not so effective as No. 2. It was used, however, on the 1912 machines by the aviators E. Korn and E. S. Daugherty. On my 1913 biplane a new design (No. 4) was tried. This system is practically the same as the Farman, but operates exactly the opposite way.

In order to correct a bank the *aileron* on the higher side is raised, thus causing a downward pressure as well as a drag on the higher wing. This, of course, accelerates the speed of the lower wing, and consequently increases the lift so that the machine rights itself without the use of the rudder. Then another system was tried in which the *ailerons* were interconnected, as in the modern Farman and Curtiss machines, but with the exception that when in their normal position the *ailerons* presented a negative angle of incidence to the line of flight. The *ailerons* were so adjusted

that when the controls were moved to their full limit the *aileron* on the lower wing was in line with the trailing edge, whilst that on the higher wing presented the necessary resistance and downward pressure to right the machine. I consider this system the best because it is easy to operate, and produces practically no resistance on the lower side. It also appears to add considerably to the general stability of the machine. My object in testing so many systems was to produce a design which would be effective, efficient and safe, without causing any drag



THE SOMERVILLE BIPLANE.—Type 2 Aileron used in 1910 experimental biplane.

"System No. 1 was found to be inefficient when the machine was near the ground, and so was discarded in favour of No. 2. This was quite good, and the machine would right itself almost immediately, while this form of

on the lower wing, and one which would at the same time work independently of the rudder. Nos. 2 and 4 are particularly suitable, since either *ailerons* or rudder may be used for both purposes.



THE SOMERVILLE BIPLANE.—Type 3 Aileron used on 1912 biplane.

"Although my machine has been flown repeatedly by M. Daugherty without *ailerons* and with only the rudder to maintain lateral stability, it is my opinion that *ailerons* are necessary if only to make one feel secure. The upturned wing tips assist greatly in giving one this confidence, as it prevents that sideslip which has proved fatal to many an aviator. Not only that, but they practically maintain lateral stability. This may seem a very strong claim, but it is a fact which has been proved on numerous occasions."

"I engaged a supposed aviator to fly my machine (later he informed me that he had never been in an

vertically. Gradually the lower wing and the tail rose to a level, and the machine commenced to glide forward and landed heavily, smashing two wheels and the skids, but suffering no further damage. The 'pilot' escaped without a scratch, but was half dead from fright!"

"The upturned wing tips have saved my life on more than one occasion, for in my early experiments my machine was underpowered and very unreliable. I unfortunately, one day in June, 1910, gave a private exhibition to my family and a few friends in order to demonstrate my ability as an aviator. Well, the flight terminated with half of the machine in some trees, and



THE SOMERVILLE BIPLANE.—Type 4 Ailerons on 1913 machine.

aeroplane before). However, the 80 h.p. H. Scott was started, and away he went, climbing at a terrible angle. It was evident from the start that he knew nothing whatever about flying. When he had reached an altitude of about 250 ft. he did a banked turn, climbing all the while, and in this critical position he stopped the engine! The machine of course lost all headway and began to drop



AERONAUTICAL SOCIETY OF GREAT BRITAIN.

Official Notices.

Meetings.—The sixth meeting of the present session will be held on Wednesday, February 4th, at 8.30 p.m., when The Rt. Hon. The Lord Sydenham, G.C.M.G., K.C.M.G., &c., will preside. Lieut.-Col. F. H. Sykes, A.F.Ae.S., Royal Flying Corps, will read a paper, to be followed by a discussion, on "Further Developments of Military Aviation."

Members are reminded that, under the rules, they may introduce visitors to general meetings.

the other half, with myself, piled on the ground. The engine being in front I was not much hurt, but the same cannot be said about my feelings, seeing that my family and friends had witnessed the performance. This finished my ambition to become a great aviator, and later, when I have occasionally tried my machines I have always taken good care to do so when my friends were not in sight."



Tickets for visitors, not introduced, may be obtained from the Secretary, 11, Adam Street, Adelphi, W.C.

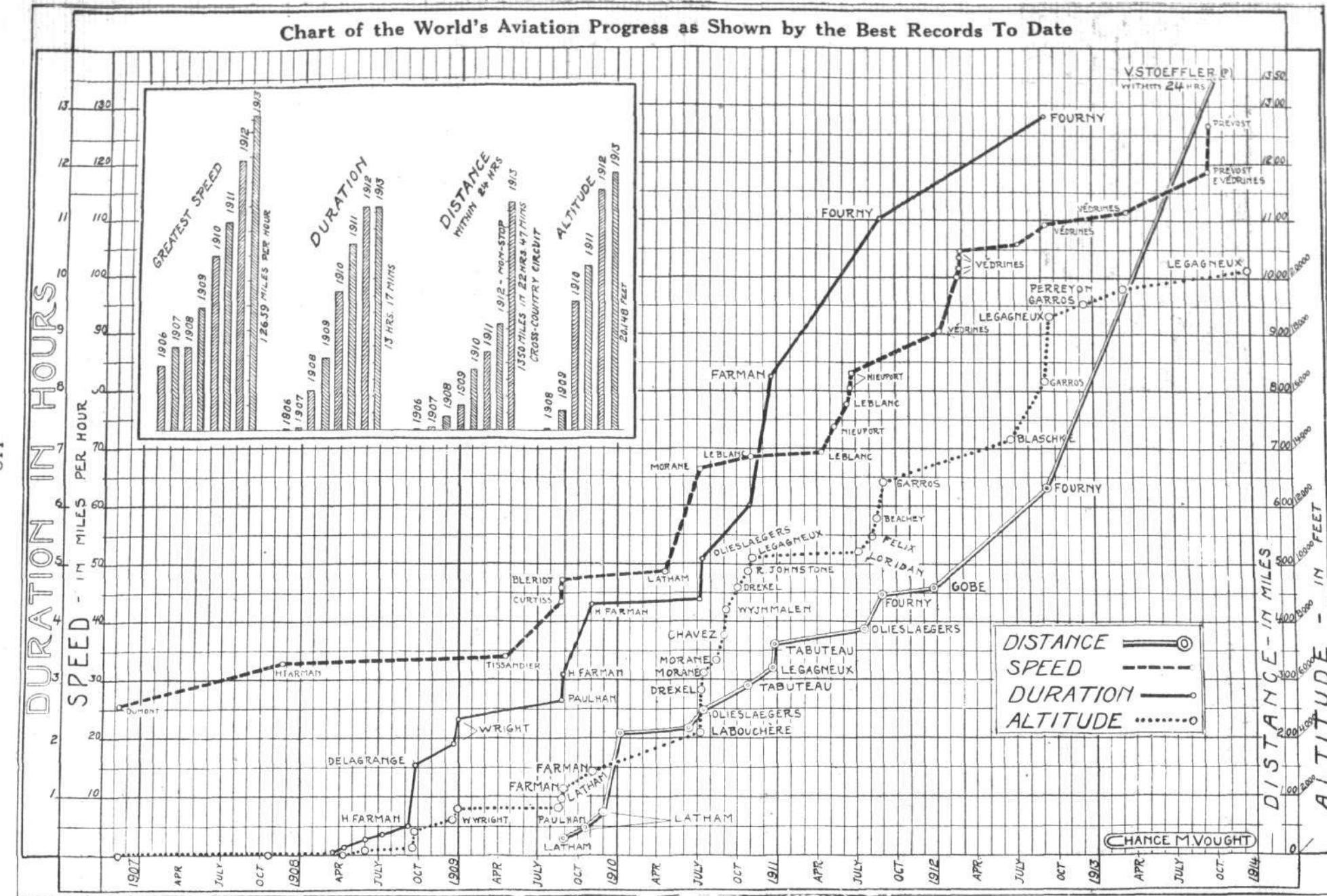
Light refreshments will be provided after the lecture.

The lecture previously announced for February 18th will not be read. In its place a paper on "Airscrews" will be read by Mr. F. H. Bramwell, B.Sc., A.F.Ae.S., of the National Physical Laboratory.

Finance Committee.—Dr. A. P. Thurston has been appointed to serve on the above committee in the place of Mr. Griffith Brewer, resigned.

B. G. COOPER, Secretary.

Chart of the World's Aviation Progress as Shown by the Best Records To Date



Compiled by *Aero and Hydro* (N. York).

"A WARNING TO PILOTS."

A REPLY TO MR. BUSK AND MR. BAIRSTOW.

By HARRIS BOOTH, A.M.Inst.C.E., A.F.Ae.S.

WHEN I wrote my article, "A Warning to Pilots," I never supposed that a serious defender of the gravity-type of air-speed indicator would arise. Since, however, Mr. Busk has published an article intended to prove that the speedometer is wrong and the velometer is right, it is incumbent upon me to deal with his ideas rather fully.

Mr. Busk is really only actually wrong in one point; but when this is corrected, the consequent modifications in his proof bring it entirely into line with mine. This point is as follows:—

After correctly pointing out that the lift is equal to the apparent weight under all conditions, stalling and falling included, he goes on to say that the "maximum lift is equal to (maximum lift coefficient) \times (area of planes) $\times \rho \times (\text{speed})^2$ ": that is correct also.

Then he says that it follows that "for safety it is necessary that (apparent weight of aeroplane) $<$ (α constant) $\times \rho \times (\text{speed})^2$ ": this is wrong; he should have said "for safety it is necessary that (weight of aeroplane) $<$ (α constant) $\times \rho \times (\text{speed})^2$ ".

From this one error Mr. Busk naturally goes on by steps which are right in themselves, to a false conclusion.

If Mr. Busk will try the effect of correcting this one slip in his proof, and the errors which follow from it, he will find that his calculations lead him exactly where mine led me.

Of course, I do not know for certain whether Mr. Busk's error proceeds from a slip or from an incorrect opinion. If he really is of opinion (which I do not for a moment believe) that the safety condition is, as he says, "(apparent weight) $<$ (α constant) $\times \rho \times (\text{speed})^2$," the following *reductio ad absurdum* will immediately convince him. Substitute in the alleged safety condition the equation "(lift) = (apparent weight)" and you arrive at the statement "for safety the condition is (lift) $<$ (α constant) $\times \rho \times (\text{speed})^2$." Now, looking back to see exactly what is meant by this "constant," we see that this statement is equivalent to "for safety the

condition is (lift) $<$ (maximum lift)"—a condition which is *always fulfilled*.

Are aeroplanes then *always safe*?

There is one other point in Mr. Busk's article on the velometer about which I want to make some remarks.

It appears that he takes more interest in the *critical angle of attack* than in the *critical speed*. Now, as a matter of fact, the reaching of the critical angle causes failure of control, while the passing of the critical speed causes actual falling.

As a personal preference, being a passenger, instead of a pilot like Mr. Busk, I would rather be out of control than falling—but I don't want to start a discussion on the relative demerits of the Devil and the Deep Sea.

* * *

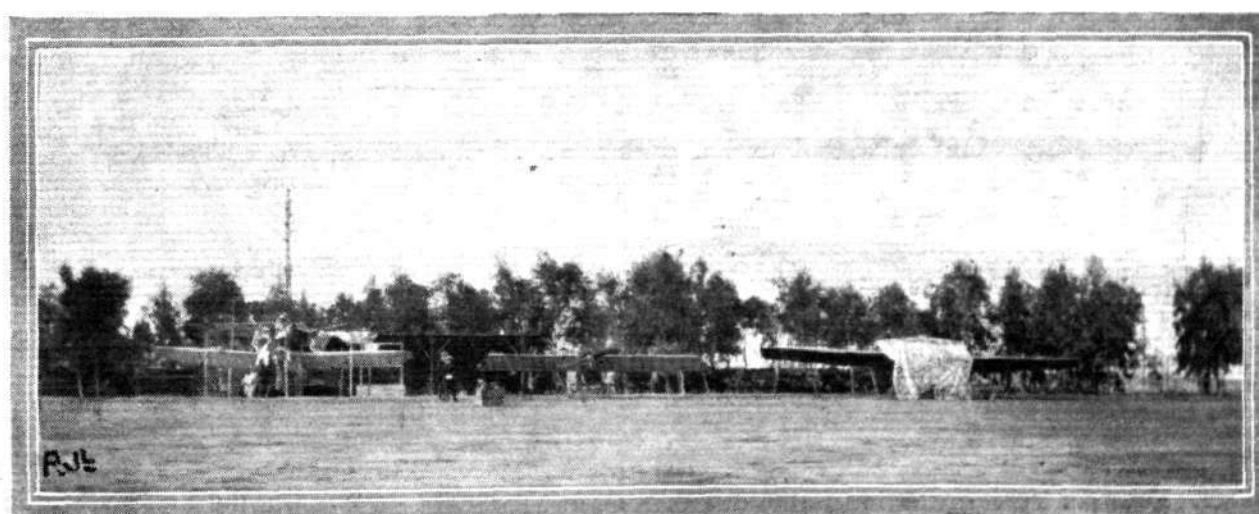
Mr. Bairstow has entirely misunderstood the question. What I said in my article, "A Warning to Pilots," applied, of course, to machines which are unstable longitudinally. Such machines require a speed indicator, and the attention of the pilot to form what Mr. Bairstow has aptly called a "stable combination."

Mr. Bairstow has apparently considered the case of a stable aeroplane, and, of course, there is no need to fit a speed indicator in this class at all.

If Mr. Bairstow's letter really applies, as I imagine, to a stable machine, let him work out the corresponding case for a machine which is just neutral—I suppose that is possible—in the longitudinal sense.

Mr. Bairstow further says that my calculations refer only to the instantaneous motion. This is incorrect. The next number of the *Aeronautical Journal* will contain an article in which I give a complete proof of the theory of the gravity-controlled air-speed indicator. When Mr. Bairstow has seen this he will, I think, admit that my statement of the condition of affairs applies for the whole motion, and not only for the instantaneous or initial motion.

* * *



THREE HISTORIC MACHINES IN LINE AT HELIOPOLIS.—In the centre is Marc Pourpe's 60 h.p. Gnome-Morane-Saulnier, which he flew from Cairo to Khartoum and is now flying back—this is the identical machine on which Garros crossed the Mediterranean; on the left is Vedrines' 80 h.p. Gnome Bleriot which was flown from Paris to Cairo; while on the right is Bonnier's 80 h.p. Gnome-Nieuport, which has also been flown from Paris to Cairo.

THE ROYAL AIRCRAFT FACTORY AND THE INDUSTRY.

ELSEWHERE in this issue we deal editorially with the serious harm which is being done, in certain directions, by the ill-informed and wildly irresponsible criticism, in more or less general terms, directed against everything and everybody associated with the Royal Aircraft Factory. One great crime that looms more largely than anything else appears to be the alleged copying of the good features of machines turned out either here or abroad, the Avro, Nieuport, Blériot, and Breguet being specifically mentioned. Without wishing to detract in any way from the splendid work put into and done by these machines, and for reasons set out in our editorial comment, we have thought it high time that some protest should be raised against this extraordinary series of attacks which can only lead to one certain end, namely, the crippling, not to say annihilation, of the financial possibilities of the industry; and without any bias one way or the other, we have deemed it worth while to investigate in detail some of the so-called "facts" to see if they will stand up to the light of day. From various sources we have gleaned some interesting data, which speak for themselves, and we give the result of our enquiries below, which should be read in conjunction with, and, as it were, as an appendix to, our editorial comment already referred to.

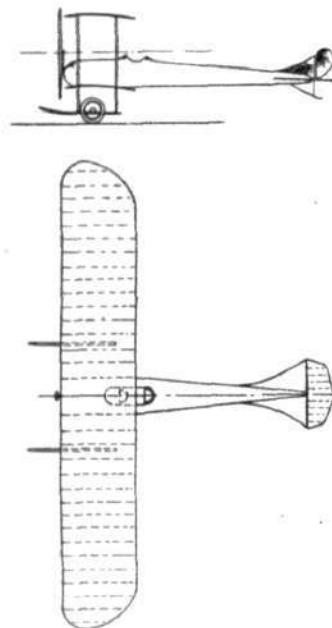


Fig. 1.—Class "B" machine.

these machines were biplanes, and were clearly indicated and illustrated by Mr. Mervyn O'Gorman, in a paper entitled, "Problems Relating to Aircraft," which was read before the Institution of Automobile Engineers on March 8th, 1911. As included in the B class, he instanced the Antoinette, R.E.P., Blériot, Breguet, and the Avro. The three first-mentioned being monoplanes, the

B.E. class were, therefore, clearly foreshadowed as early as March 8th, 1911, and must have received serious consideration long prior to that date, most probably in 1910, although the tail ultimately adopted was somewhat modified from that shown in the illustrations given in the paper. Furthermore, an examination of the drawings of the S.E. machine already referred to will elicit a very interesting fact, if the rudders are removed and the wings, tail skid and landing chassis are reversed, namely, that this machine is to all appearances similar in construction to the B.E. design.

At that time the only biplane in any way resembling this class of machine was the Breguet (see FLIGHT for December 17th, 1910, and July 22nd, 1911), but the construction of the wings, landing gear, fuselage, and tail planes were so radically different as to leave no opening for a valid suggestion that any part had been copied in the B.E. machines. There was but one row of struts between the main planes, which were formed by ribs hinged upon a steel spar; the steel landing gear was, and still is, of a special and peculiar type, and no rear skid was employed; the front portion of the fuselage was built up of pressed steel members, joining into a circular tube which continued to and supported the tail, which was mounted upon a universal-joint and had no fixed planes. Since that time, Mr. De Havilland designed a form of buffer gear for the landing chassis, which operated on the gun-recoil principle, but the only likeness to the Breguet construction was in its external appearance. The use of this particular form of gear has, however, since then been discontinued.

Early in 1911 Mr. A. V. Roe was principally engaged on his triplane, and had not then commenced to achieve those successes that have since been attained by his biplane. His triplane had a fuselage of triangular section, and only the part in the vicinity of the wings was covered in, whilst the tail planes were of flat section and formed by trapezium-shaped planes. The tail planes of the Avro biplane were also of flat section, but of rectangular form with corners removed (see FLIGHT for November 4th, 1911). The tail planes of the Nieuport monoplane (see FLIGHT for December 17th, 1910 and October 7th, 1911) were also of flat section (see Fig. 2). On the other hand, the tail plane (see Fig. 2c) for the B.E. machine, was designed by Mr. G. J. Watts, (then of the Royal Aircraft Factory and now of the staff of Messrs. Vickers), the design being most elaborate, and based upon curves of righting moments. It has since been superseded by the section shown in Fig. 2d, the reasons for so doing being given in the Advisory Committee's Report.

The differences in the shape of the wings and tail in plan is, however, of little consequence, and the particular manner of rounding off the planes is not significant compared with the enormous importance of a section. In the design of the early wings of the B.E. machines the results of Eiffel's experiments were consulted (see Advisory Committee's Reports for 1911-12) as is also done by the designers of many other machines, and in accordance with that writer's recommendations a section intermediate between Blériot XII bis and another form was tried, although this particular section was abandoned later on the strength of model experiments carried out in an air channel at the National Physical Laboratory at the request of the Royal Aircraft Factory.

The construction of the supporting surfaces on the Breguet

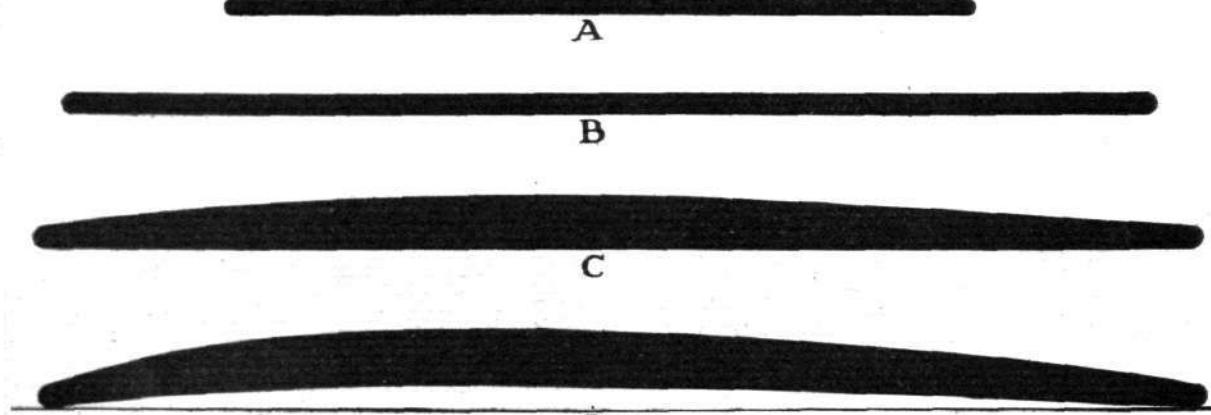


Fig. 2.—Sections of tail planes: A, Avro tail, 1910-11. B, Nieuport tail, 1910-11. C, B.E. tail, 1911. D, B.E. tail, 1912.

last a triplane, and the Breguet a biplane, the classification being governed by the position of the propeller relative to the main planes and the location of the smaller plane, which, in this class, is more lightly loaded than the main planes. The

biplane, which are quite a special feature of this machine, have already been discussed; and as regards the Avro biplane there are differences in the plan form, internal construction, and the method of assembling, which are readily observable from a comparison

between Figs. 1 and 4 and the scale drawing of B.E. 2a, given on page 1062 of FLIGHT for November 16, 1912, whilst the strut section and arrangement are dissimilar. The Nieuport monoplane also embodied an entirely different form of wing surface.

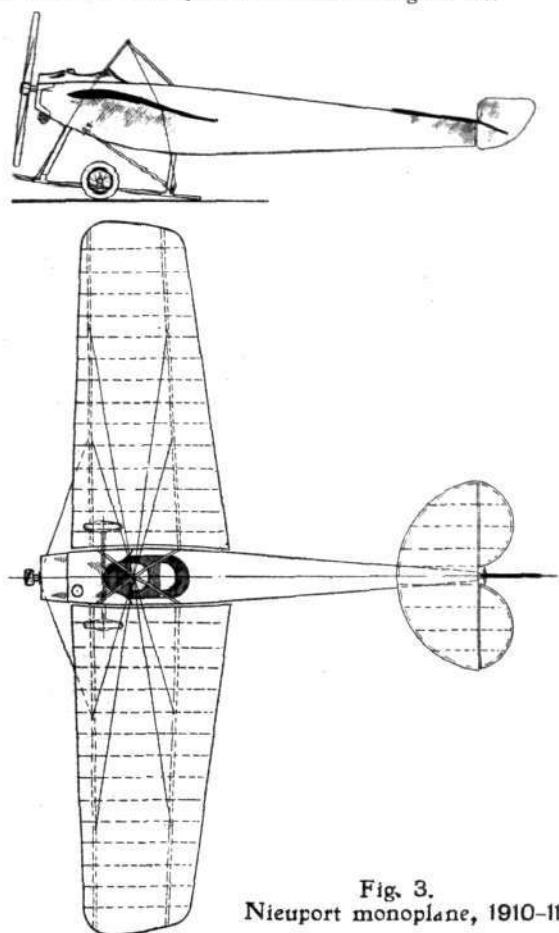


Fig. 3.
Nieuport monoplane, 1910-11.

The fuselage of the 1911 Avro biplane was of triangular section, whereas that of the S.E. class had a rectangular section, and the B.E.'s were, and still are, of rectangular form with a rounded upper surface for a short distance behind the pilot's seat. Further, the open bodywork and section of the Blériot cannot be regarded as in any way similar to the Army machines, which are canvas-covered. The body of the Nieuport also, although covered in, was dissimilar from the B.E. in regard to the shape of the nose and its proportions, the fuselage having exceptional depth at the front end.

In the landing gear similar differences occur, as references to the drawings and illustration already mentioned will show, the Avro having a chassis of the Farman type, supported on four wheels, on the triplane; and the arrangement seen in Fig. 4 on their biplane, the construction used on the Nieuport being illustrated in Fig. 3; whilst the special designs of chassis, employed on the Breguet and the Blériot, are already too well known to need further demonstration as to their absolute dissimilarity. As regards the tail skid, this was, and still is, to a large extent, of a design peculiar to the B.E.'s, and was evolved for the purpose of rendering the machines manageable on the ground at low speeds, when machines controlled solely by the air rudder are out of hand; whilst it also enables a machine to be turned in a very short radius (see Advisory Committee's Report for 1911 and 1912).

Coming to more recent times, it will be found that the special form of wing surface construction, under-carriage, fuselage, and tail of the Breguet machines remain, and have undergone little fundamental change, except that the wings are now mounted rigidly upon the steel spar, *ailerons* are fitted, and the whole machine has been made more robust (see FLIGHT for February 22nd, June 14th and December 27th, 1913). On the Avro (see FLIGHT for March 30th and August 31st, 1912, and December 6th, 1913), the triangular-shaped fuselage has given place to one of rectangular section, which tapers to a knife edge at the rear, the upper surfaces being horizontal in straight flight; whilst ample depth of section has been given to the fore part, primarily in order to afford greater comfort for the pilot. The landing chassis has also been changed, for, instead of the double skids used on the earlier machines, a construction somewhat, though not exactly, similar to that used on the Nieuport (see FLIGHT or October 7th, 1911) is embodied, where a single skid

supported on a spring axle, carries the machine on V-struts, the latest machine having shock absorbers fitted to these struts. On the latest model the main planes are staggered, the upper plane being slightly in front of the lower, a construction which was first employed, at all events in this country, on B.E. 3 (see Advisory Committee's Report, 1911 and 1912) as the result of research at the National Physical Laboratory, and because they permitted a larger field of vision. *Ailerons* were first fitted to the Avro hydroplane (see FLIGHT for June 14th, 1913), and have also been used on the machine subsequently developed.

On the Nieuport machines, minor alterations have been made, such as affect the shape and dimensions of the planes, *fuselage*, &c.—the body, for example, has been tapered to a vertical knife edge at the rear (see FLIGHT for March 22nd and April 19th, 1913); but the general design employed on the earlier machines is still continued.

With regard to the B.E. machines, many changes have been made in the course of the last three years, but these have been principally in regard to the wing section, and as such no suggestion of copying can be seriously entertained. Different methods of wing fixing, various forms of control mechanism, and other minor variations in design have been tested with the object of finding that which is the most effective for military purposes; but the essential features that have characterised the B.E.'s from their inception are in the main still retained on the latest types. Among the alterations which may be mentioned as having been made are the staggering of the planes previously referred to, the hinging of the rear spars of the main planes, and the equalising of the span of the upper and lower wings for the purpose of interchangeability; whilst the tail area has also been varied, its construction, however, remaining practically the same as in the earlier machine.

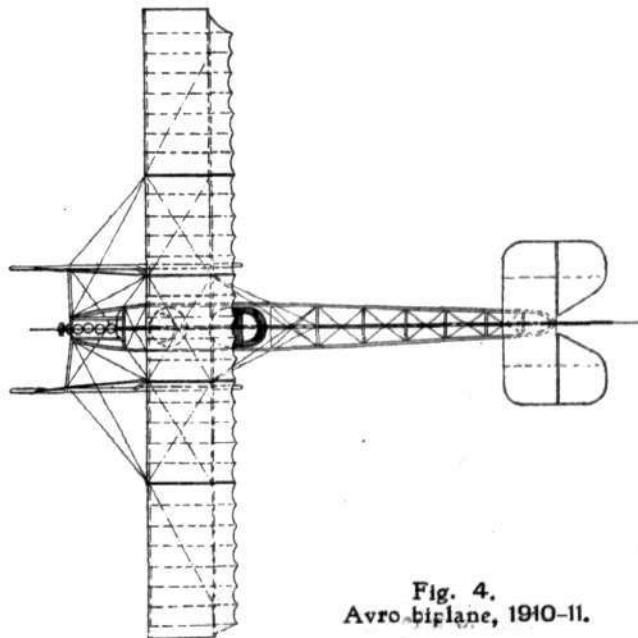
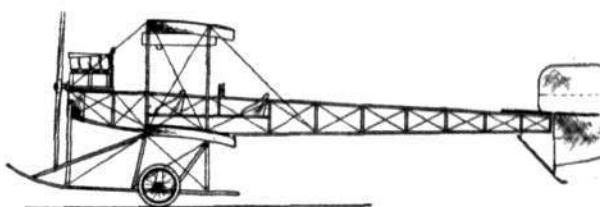


Fig. 4.
Avro biplane, 1910-11.

In conclusion, we may observe that similarities in some respects must necessarily exist between one machine and another, as is clearly evident from an inspection of current types of aeroplanes, for in the endeavour to obtain the highest efficiency, surfaces are smoothed off so as to obtain a streamline form, and thus become more and more like one another in appearance, especially as the same authorities are consulted in their design, and the purposes for which the completed machines are intended to be used, are very similar. But these points of resemblance are common to other machines than those referred to, and we therefore say it is evident that the individual characteristics of the original B.E. class of machine are still retained, and have not been modified by the introduction of fresh features copied from other machines.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Eastchurch Flying Grounds.

Monday last week was a busy day at Eastchurch. First thing Capt. Kilburn was up on Short 65, making a high flight. Later he flew on the same machine to the Isle of Grain, returning later with Mr. Gordon Bell as passenger. Capt. Courtney took up Sopwith 27, Lieut. Marix Bristol tractor 43, and Lieut. Pierce Dep. 36. Lieut. Marix made a fine flight on the Bristol tractor 43, making nicely banked turns and flying at low speed. Lieut. Pierce also made a good long flight on Sopwith 27. Lieut. Littleton also flying well on Dep. 36. Capt. Courtney took up the Dep. 36 just before dusk.

Com. Samson was making numerous flights Tuesday on S 100 h.p. tractor, taking Mr. C. R. Fairey as passenger. Capt. Kilburn was up on S 65, making two long and high flights. Capt. Kilburn also made a nice flight on Avro 41. Later Com. Samson took up S 3 for a long cross-country flight, taking Fairey as passenger as before.

All the pilots and machines were hard at work all day Wednesday. Lieut. Marix made a fine flight on S 65. Then Lieut. Collet and Capt. Kilburn had the same machine up in turn. Lieut. Pierce flying well on S 64. Lieut. Pierce, with Lieut. Clarke Hall as gunner on the gun (Maxim) machine No. 66, Lieut. Marix flying well on S 65. Lieut. Collett made an extensive flight on S 64. Telegraphist Sparks made a good show on the M. Farman. P.O. Andrew on Avro 41. Leading Seaman Bateman on the M. Farman with a passenger. Lieut. Marix made a long and high flight on Dep. 36, finishing with a fine spiral descent. Lieut. Collett was up for a long turn on S 65 making fine banked turns. Capt. Courtney instructing on S 2.

Thursday again saw all pilots up. Com. Samson, with Lieut. Clarke Hall as passenger, left for Farnborough in morning on S 3. Lieut. Collett flying well on S 65. Lieut. Davis making a fine long flight on Sopwith 27; Lieut. Marix also putting up a good show on same machine. Lieut. Pierce on S 65, Capt. Kilburn on S 64. Capt. Courtney instructing on S 2, later pupil doing straight with Capt. Courtney in passenger's seat. Asst.-Paymaster Finch Noyes on H. Farman 31. Eng.-Lieut. Briggs up nearly all afternoon on Blériot 39. P.O. Andrews on Avro 41, and Leading Seaman Bateman on same machine. Lieut. Osmond making long flights on S 64 and 65.

Friday was rather slack. Capt. Courtney instructing on No. 2. Lieut. Osmond made two circuits on No. 2. Later the pupil flying straight and making some good circuits. Com. Samson returned, with Lieut. Clarke Hall as passenger, from Farnborough on S 3.

Although there was a heavy mist Saturday and it was freezing hard, Capt. Courtney had his officer pupil. After one short straight the pupil made some fine circuits and landing, doing his circuits from a good height, keeping this up till lunch time. Mist coming on thicker prevented him going out again.

Civilian Flying.—Monday morning, last week, Mr. Bell was up on the Short 100 h.p. Gnome tractor. After a short preliminary flight he headed straight for the Isle of Grain Hydro Station, where he made a safe landing, Mr. C. Fairey accompanying him. This machine is intended for the Grain Station. On Thursday, Mr. Gordon Bell was up again on the new Short tractor. After a few staid circuits he put up a fine show of fancy flying. On Saturday, Mr. Bell was again flying the machine, making some good high and cross-country flights, but owing to mist and extreme cold he could not get very far away.

Brooklands Aerodrome.

ON Monday last week, the Vickers and Bristol Schools were at work both morning and afternoon. Mr. Barnwell with a passenger was further testing the 100 h.p. Vickers gun-carrying biplane.

Mr. Pixton with a mechanic as passenger started for Farnborough on Tuesday in a gusty wind, but finding the weather conditions too bad, returned to Brooklands, and went over to Farnborough in the afternoon.

Mr. Barnwell flew to Farnborough on the Vickers gun-carrying biplane, on Wednesday. Messrs. Merriam and Halford were busy at the Bristol School with pupils. Mr. Raynham made several good flights on the 80 h.p. Avro, afterwards testing the new 50 h.p. Avro, and flying to Farnborough on the 80 h.p. Avro. Mr. Alcock was testing the Maurice Farman with its 100 h.p. Sunbeam engine.

On Thursday, Herr Roempler was out on the D.F.W. all-steel biplane. The Martinsyde monoplane made a number of flights. The Bristol and Vickers Schools were busy with pupils. Mr. Alcock was out on the Maurice Farman (100 h.p. Sunbeam) biplane. Mr. Raynham flew to Hendon to deliver the new 50 h.p. Avro ordered by Mr. Hall. Mr. Barnwell was testing the Vickers gun-

carrying bus. Mr. Crawshaw flew over from Hendon on a 50 h.p. Blériot monoplane, which he left at Brooklands for overhaul at the new Blériot works. Lieuts. Adams (50 h.p. Avro, No. 289), Hordern (50 h.p. Avro, No. 291), and Wilson (50 h.p. Avro, No. 288) arrived from Farnborough within a few minutes of each other, returning thence after a short stay.

The Bristol and Vickers Schools were engaged all day with their respective pupils on Friday. On Saturday Mr. Raynham gave some excellent exhibition flights on the 80 h.p. Avro biplane, and Messrs. Barnwell and Waterfall made a number of circuits on the Martinsyde monoplane, Mr. Waterfall being in the air for some time and finishing with an extremely well-judged landing.

On Sunday the weather conditions were by no means ideal, and only two machines ventured up in the gusty wind which was blowing—the Martinsyde monoplane and the 80 h.p. Avro biplane. Mr. Raynham took up the winner of the ballot for the free passenger flight, Mr. N. Huggins, of Cherry Orchard, Staines, on the Avro biplane, the machine making a perfect landing in the gusty wind. Mr. Pixton had one of the Sopwith (Green) biplanes out for testing.

Next week an 80 h.p. Avro (propeller) biplane, suitable for gun carrying, is expected.

Bristol School.—The high wind prevented any tuition in the early morning of Monday, last week, but towards mid-day it became calmer, and Merriam and Halford took Air-Mechanic Locker and Lieut. Binney on several long flights, the latter pupil



Mr. Thomas Hinshelwood, who passed the necessary tests for his *brevet* at the Vickers School, Brooklands, on November 25th last.

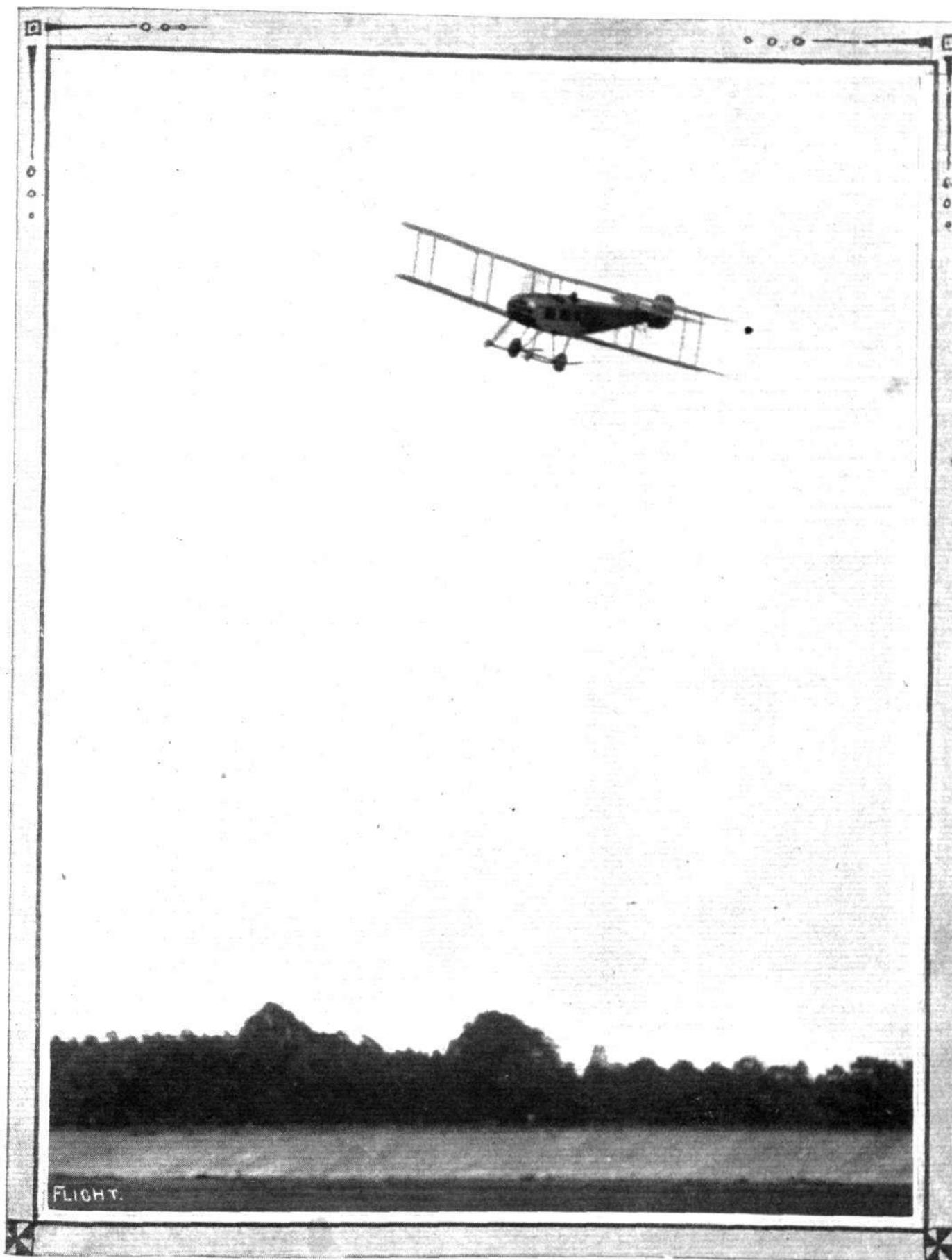
having complete control. Mr. Racine Jacques made two straight but found it too bumpy to continue. Merriam took Lieut. Lawrence, in the afternoon, for his first flight, Halford following with Lieut. Ames, and later Lieut. Lawrence. Merriam sitting behind Lieut. Binney (twice) on straight and circuits, also behind Lieut. Ames.

Tuesday, too windy for school work. Wednesday, after testing, Halford took Lieut. Lawrence and Lieut. Fraser on straight and landings, Merriam following shortly afterwards with Lieut. Binney and Lieut. Lawrence. Halford giving tuition to Lieuts. Fraser and Lawrence and Air-Mechanic Locker, during which Mr. Racine Jacques made two solos. Merriam then in the passenger seat with Lieut. Binney (twice), Lieut. Fraser and Air-Mechanic Locker. The strong wind in the afternoon prevented any tuition.

Halford gave tuition to Lieut. Binney, and afterwards to Lieuts. Fraser and Lawrence, Thursday. Merriam then took Lieut. Binney on straight and with Lieuts. Lawrence and Fraser and Air-Mechanic Locker, the three latter having complete control. Lieut. Fraser then made his first solo, which he accomplished splendidly. After breakfast Merriam made a solo test flight over Weybridge, and then took Lieut. Binney for tuition. Halford went out with Lieut. Lawrence on straight and circuits. Lieut. Fraser afterwards made a short solo, but found the weather was too bumpy to continue.

JANUARY 31, 1914.

FLIGHT



AT BROOKLANDS.—Mr. Hawker in flight on the Sopwith Tractor during the past season.

The weather all day Friday was very foggy, but, clearing for a short time, Halford took Lieut. Fraser for tuition, then gave a long flight each to Lieut. Lawrence and Air-Mechanic Locker, afterwards sitting behind Lieut. Fraser.

Saturday, no tuition was possible all day on account of the fog in the morning, followed by a strong wind during the afternoon.

Vickers School.—Wednesday, last week, Elsdon and Knight on biplanes with Lieuts. Crosbie, Monckton and Prichard.

Thursday, Knight and Elsdon on biplanes with Lieuts. Crosbie, Monckton and Prichard, and Mr. Creagh. Mr. Hinshelwood straight on No. 3 Mono. Barnwell on biplane with Lieuts. Crosbie, Monckton and Prichard and Mr. Hurst. Barnwell testing new gun-carrying biplane.

Friday, Knight and Elsdon with Lieuts. Crosbie, Monckton and Prichard, and Mr. Creagh on biplane. Barnwell with Mr. Hurst and Lieuts. Monckton and Crosbie.

Sunbeam Activity.—On Wednesday, January 21st, Jack Alcock was flying the 100 h.p. Sunbeam-engined M. Farman, carrying a passenger, for one hour. Several exhibition and passenger flights were made on the following day, while on Friday passenger flights, aggregating two hours, were made.

Eastbourne Aerodrome.

FRIDAY was the first possible day for school work during last week. Gassler was out early on the E.A.C. biplane, and later took Mrs. Salmon up for four lessons. Fowler was up on the Bristol, passenger carrying, and Hunt was also out on the Bristol. In the afternoon Mrs. Salmon had two more stunts, and Hunt was out again.

Saturday, Gassler was up, with Mrs. Salmon driving, for four trips. Mrs. Salmon is now handling the controls very well, and will soon be able to do a solo. Hunt was again up in the afternoon.

Monday afternoon Mrs. Salmon was out three times with Gassler, and Hunt had three stunts over the surrounding country.



Mr. F. G. Dunn, who has secured his *brevet* at the Blériot school at Hendon.

London Aerodrome, Colindale Avenue, Hendon.

Grahame-White School.—Wednesday, last week, weather very bad, but Messrs. Lillywhite and Cripps circuits and spirals, &c.

Messrs. Parker, Cowley straight Thursday, with Instructor Strange in passenger seat. Messrs. Bjorkland, Cripps, Norris, Lillywhite solo circuits, spirals, &c.

Friday, Messrs. Piercy, Parker, Cowley, Lindop straight with Instructors Manton and Strange in passenger seats. Messrs. Barrs and J. B. Graham (new pupils) rolling and straight with Instructor Manton or Strange. Messrs. Carr, Bjorkland, Norris, Cripps, solo circuits, figures of eight, &c.

Blériot School.—On Thursday and Friday last week, Jules Teulade, Chief Instructor, made several flights in *brevet* monoplane. Mr. E. Gower, certificated pilot, made several flights for practice. Mr. Dunn made all his trial flights for the certificate, with complete success.

Mr. R. O. Crawshaw flew on 50 h.p. Gnome-Blériot from Hendon to Brooklands, leaving the machine there in the new Blériot sheds.

W. H. Ewen School.—At the beginning of last week it was too windy for pupils. M. Baumann was out for a short time on the *brevet* machine on Wednesday morning, but found it too bumpy for school work.

On Thursday, the pupils were out at 8.10 a.m. After a test flight by M. Baumann on the *brevet* machine, Mr. Murray did circuits and landing practice with the engine shut off, and Mr. Cooper was doing circuits and making nice landings. On the 35 h.p. Caudron No. 1, Mr. F. W. Goodden made a test flight, after which Lieut. Kinnear and Mr. Banks-Price did straight, Mr. Freshney short flights, and Mr. R. G. Garvin, a new pupil, was rolling.

The School was out at 9 a.m. on Friday, when, after test flight by M. Baumann on *brevet* machine, Messrs. Cooper and Murray did some good circuits. On 35 h.p. Caudron No. 1 Mr. Goodden was instructing Lieut. Kinnear, who was doing straight and half-circuits, Mr. Price straight, and Messrs. Busk, Carruthers and Garvin rolling. At 3 p.m. the pupils were again out under the instruction of M. Baumann and Mr. F. W. Goodden. On *brevet* machine Mr. Cooper doing circuits, figures of eight and *vol plané* without engine, and Mr. Murray doing circuits. On 35 h.p. Caudron No. 1 Lieut. Kinnear half-circuits, Mr. Price straight, and Messrs. Busk, Carruthers and Garvin rolling.

Hall School.—Sunday week, J. W. Hall flying Caudron at 1,000 ft.

Monday and Tuesday, a gale. Wednesday, No. 2 Caudron adjusted for pupils, and Thursday, 50 two-seater (dual control) arrived from Brooklands, piloted by P. Raynham. J. W. Hall took delivery and put machine through climbing tests. Two passengers carried, and Mr. Russell, of Ewen School. W. A. Burn received instruction, Friday, on dual control Avro biplane, No. 1 Caudron meanwhile being fitted with 50 Gnome. Too foggy, Saturday, for practice. In afternoon J. W. Hall managed to give a short exhibition of flying on 50 Avro, and afterwards took out double-surfaced Caudron for tests.

Sunday, Mr. Allen received instruction on Avro in 30 m.p.h. wind.

Salisbury Plain.

Bristol School.—Monday, last week, Jullerot first made a trial flight, afterwards taking Capt. Walcott for two flights, Mr. Gipps in the meantime having tuition on the tractor biplane. Voigt took up Mr. Stutt for a long flight, and later, while Jullerot was flying solo on the tractor, gave tuition to Capt. Walcott (three trips) and Mr. Stutt (two trips).

Tuesday, weather unfit for tuition.

Voigt, after making a trial flight, Wednesday, gave landing practice to Mr. Stutt and took Capt. Walcott for a flight. In the afternoon Voigt gave tuition to Mr. Stutt twice and also to Capt. Walcott twice. Jullerot also made a solo on the tractor biplane, taking a lady passenger.

Voigt out for test, Thursday, then with Mr. Stutt and Capt. Walcott for tuition. Jullerot made a flight on the tractor, afterwards taking Mr. Tod on the same machine, Sippe then going up for a solo.

Friday, Mr. Stutt was taken for two flights by Voigt, after which Jullerot took out the staggered plane tractor biplane, taking in turn as passengers, Capt. Walcott, Mr. Gipps and Lieut. Huish. Voigt with Mr. Stutt and Capt. Walcott for two flights each, the latter pupil then going with Merriam for spirals and banked turns. Merriam made a solo on the tractor biplane.

Jullerot and Voigt gave tuition to Mr. Stutt (three flights) and Lieut. Binney on Saturday, after which the former instructor made a solo in the tractor, then taking Lieut. Binney as passenger. Sippe and Merriam each made good solos on the tractor, the latter then taking Mr. Stutt for tuition on the school biplane. In the afternoon Merriam went out for 20 mins. on the tractor, rising to 2,000 ft., landing with spirals. Jullerot gave tuition to Mr. Stutt, but the weather prevented any further flying.

Shoreham Aerodrome.

A CONSIDERABLE amount of school work has been done during the past week, the weather having been much more favourable for practice than it has been for a considerable time. Every day has seen quite a lot of good work, and Mr. R. P. Cannon and Lieut. Clemson, R.N.R., have done good circuits on the 45 h.p. Green-Avro.

The pupils doing "straight" during the week were Messrs. A. Maskall, F. Maskall, Furnell and Hayland-Wilson, and the last named shows great promise, handling the 45 h.p. machine exceptionally well. Mr. Arkman (new pupil) has done his rolling practice, and is now promoted to the more powerful machine. Mr. William H. Elliott has acted as instructor during the week, and has also put up some particularly good flights.

A Henry Farman type machine, fitted with a 50 h.p. Gnome engine, will be added to the school machines in a week or so.



The Royal Aero Club of the United Kingdom

■ OFFICIAL NOTICES TO MEMBERS ■

International Races.

THE attention of Aviators and Manufacturers is particularly drawn to the following notices regarding International Races :—

THE JACQUES SCHNEIDER MARITIME AVIATION CUP AND PRIZE, 25,000 FRS.

Mr. Jacques Schneider has given a trophy of the value of 25,000 francs and a cash prize of 25,000 francs for three years for international maritime aviation competition.

Each club affiliated to the Fédération Aéronautique Internationale has the right to challenge the holder, the Aero-Club de France, and such challenge must be sent in before March 1st, 1914.

The Committee of the Royal Aero Club will select three competitors to represent the British Empire, and intending candidates are requested to notify the Secretary on or before Tuesday, February 24th, 1914, of their willingness to compete, if chosen. Applications must be accompanied by a cheque for £20, the entry fee, which amount will be returned should the entrant not be selected.

Regulations for 1914.

(Translation from the French.)

The distance to be accomplished for the Jacques Schneider Maritime Aviation Competition in 1914 is 150 nautical miles.

The Competition will take place exclusively at sea on a closed circuit having a minimum course of 5 nautical miles and situated outside any port or closed harbour. Alightings are permitted.

Competitors may start at any time they wish between 8 a.m. and the official hour of sunset. Only one attempt is allowed, and before starting a competitor must notify the officials of his intention to take part in the Race. Two copies of the final regulations will be handed to all contestants, and one copy of these regulations, signed as approved, must be handed by the competitor to the official before starting in the competition.

The competitor will then navigate his machine over the line of departure, rise, and make a tour of the course with at least two alightings on the water at points indicated by the officials. This having been accomplished, he must proceed without alighting to make the first lap of the circuit, clearing the line of departure in full flight. He must then continue the course until the whole distance has been completed, when the arriving line must be passed in full flight and the alighting made on the course.

The Race will take place at Monaco on April 20th, 1914.

GORDON-BENNETT AVIATION CUP.**Rules for 1914.**

The Race for the Gordon-Bennett Aviation Cup will take place in France this year.

The Race will be over a distance of 200 kilometres on a course having a minimum distance of 5 kilometres.

Competing aircraft, before taking part in the Race, will have to pass the following preliminary test :—

A flight in a straight line out and back of about 2 kilometres, without touching the ground, at a constant height of not more than 30 metres. The speed of the test shall be the mean of the speeds of the flights out and back, which must not exceed 70 kilometres per hour. In this test the aircraft must carry sufficient petrol and oil to cover the whole course of 200 kilometres. Three attempts will be allowed to each competitor.

After the qualifying tests have been passed, no modifications may be made to the aircraft. Repairs will only be allowed with the permission and under the control of the Officials.

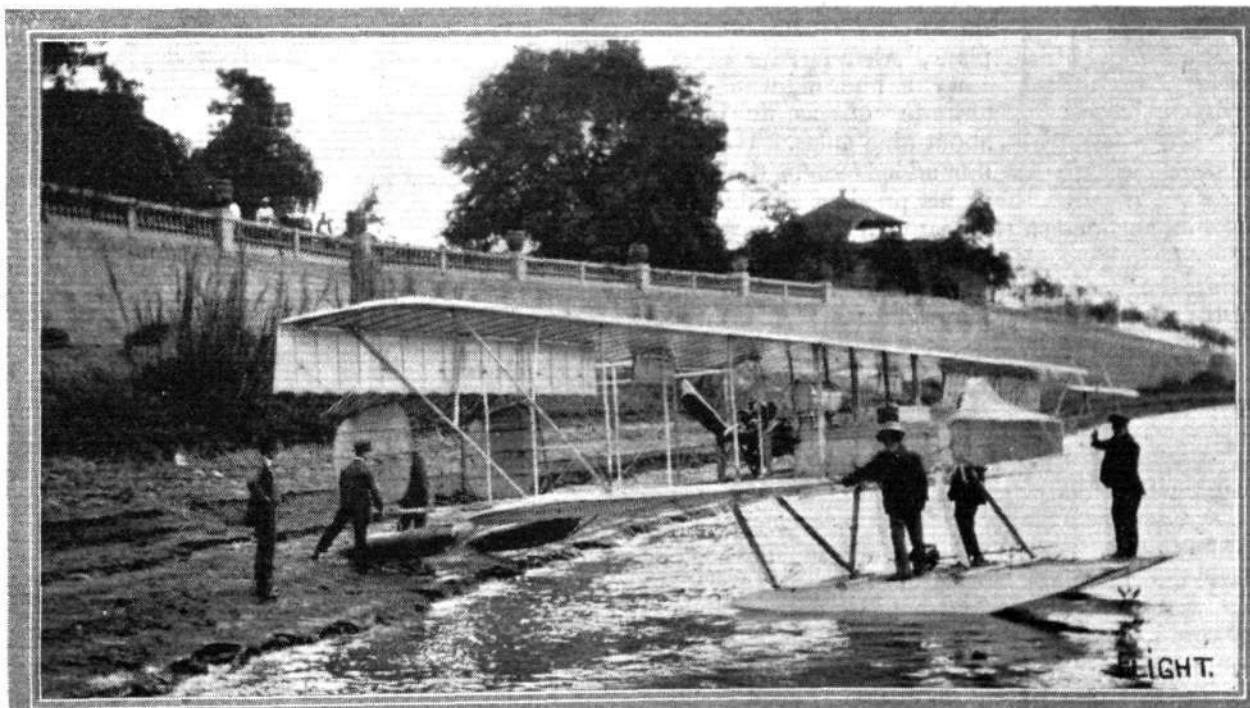
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International Hydro-Aeroplane Competition.

The Club has received particulars of an International Hydro-aeroplane Competition to be held on the Rivers Scheldt, Meuse and Rhine, on June 15th-25th, 1914. The contest is over a course of about 1,400 kilometres and the prizes amount to about £5,000. The organisation is in the hands of the Aero Clubs of Belgium, Germany and Holland, and the competition will be held under the rules of the Fédération Aéronautique Internationale. Further particulars may be obtained from the Royal Aero Club.

166, Piccadilly, W. HAROLD E. PERRIN, Secretary.



Another view of Mr. Frank McClean's Short waterplane on which he has been helping to make history on the Nile. Standing on the near float is Mr. Horace Short, the designer and constructor of the machine.

EDDIES.

I SEE the French have started all-night airship flights now. The airship "Adjudant Vincenot" left Issy-les-Moulineaux at six o'clock last Friday evening, and did not return till eleven the next morning. They say it journeyed to Verdun and back : but did it ? We don't want any more of the night-scare business that we had a few months ago, and, moreover, a lot of our coastguards are married men, and don't want to be kept out all night walking the cliffs looking for airships, and not seeing them after all their trouble, when there is a nice warm bed waiting at home. I think they ought really to give an undertaking not to come over our side of the streak. I would have them remember also that most parts of our coastline is prohibited area, and they mustn't fly over it at all. If they want to see Dover or Folkestone, they should come over by boat in the orthodox way. If they come by air, we shall signal to them to come down ; and if they ignore our signals we shall—well, I am not quite sure what we shall do, but we shall be quite nasty about it.

x x x

Lincoln Beachey has added indoor flying to his other achievements, and is now making flights in the Machinery Hall of the Panama Exhibition at "Frisco." According to reports, he has said that all he now yearns for is to fly underground. If his flight is really a flight, and not a hop, I should say he is doing his best to realise his ambition. I don't know what size this hall may be, but it must beat anything we have on this side if he is really

flying in the true sense of the word ; but then they DO top us in everything where size is concerned. As to flying indoors, our inimitable Harry Tate has been doing this for quite a while, and is still doing it afternoon and evening at the London Hippodrome. I saw him, only the other day, on his "Very hot potato-plane," when he gave Ethel Levy a fine flight at an altitude of, as he said, about nine miles. He has now added looping the loop to his previous exhibition,

and to see him accomplish this feat with Miss Levy is a thing not to be missed. He does it so easily too. To save any risk, the fuselage, if it may be called one, stands still whilst the wings turn round. Tate says this is much the better way and saves no end of bother ; but Miss Levy seemed disappointed that she had dressed for the part, and was not going to turn upside-down after all.

x x x

If great events cast their shadows before, it must be their reflections that follow behind. I heard a good deal about the upside-down dinner before the event, but I have heard of some rather curious happenings since which filter out gradually in conversation. Lots of people who were there have asked me if I was. If they were there and did not see me, either—well, never mind. To get on with the story. One and all, before many words of their story had passed, have said, "I got home about two," or "I didn't get home till nearly four"—in fact, I am firmly of belief that such an effect had this



topsy-turvy business on some, that they are not quite sure whether they went home at all, and even so, what time they arrived. I believe there were all sorts of minor troubles on the various ways home. I heard of one car-party who had not got so very far when something went wrong with the works, which could not be put right without spare parts. I believe—mind you, this is only what I gather, and I can in no way vouch for the truth of it—that somebody set off to Hendon to bring relief in the shape of another car, and that in going back to search for the wrecked ones, who were presumably somewhere between Hendon and Piccadilly, the districts searched included Hendon, Golders Green, Finchley, Barnet, Potters Bar, Camden Town, and a few other places ; meanwhile, the wrecked ones, tired of waiting, walked home.

x x x

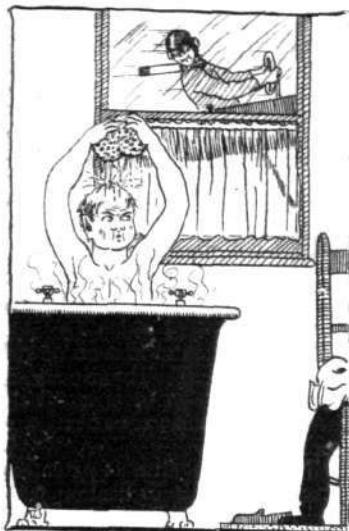
The *Daily Citizen* says there is surely a touch of irony in the fact that a model Zeppelin had been placed on view in the cold luncheon-room of the Law Courts. I'm afraid I don't see the joke, but no matter. I see it is the work of one of the chefs employed at the Courts, who has also made a model aeroplane "from unpromising materials he found in the Law Courts' kitchen." I should not have thought they would have had any unpromising material in the kitchen at all ; but I suppose trade is so bad in the business of getting briefs just now that the poor barristers have to cut expenses, and cannot afford to pay the price they used to do for their little luncheons. By the way, these same legal luminaries, or others like them—it is hard to tell, they are so much alike—seem to delight in going down to the Embankment every day during the luncheon hour to feed the gulls. This should be one of the sights of London. The Law providing food for the gulls ! It is generally the other way about.

x x x

It is with regret that we have to once more place on record the death of a pilot. Mr. G. Lee Temple was killed at Hendon on Sunday last. Flying on his Blériot, it appears that he attempted to land with the wind, in one of the steep dives he has so recently been executing, from an altitude of only about 300 ft., and that a gust of wind under the tail put the machine over the vertical. Being so near the ground he had no room in which to flatten out, and the machine struck the earth almost nose on, killing the pilot on the spot. Temple was a very promising pilot, and was coming on tremendously in his flying. He was very proud of the honour of having been the first Englishman to fly upside down in this country, though he wisely listened to the advice of older pilots that his machine was not quite suited to the strain put upon it, and had decided to give up all thought of looping the loop till he could get a machine from Blériot specially designed for the purpose. He will be missed at Hendon during the coming season, and we beg to offer our sincere condolences to his family.

x x x

The flying of machines over and about the houses at Hendon and district appears to be causing much dissatisfaction among the residents. A writer to the *Times* complains that the airmen fly right over his house and garden, so low as to sometimes almost touch the conservatory roof. Another complains



that they fly so near his house and so low that he sometimes feels inclined to draw the curtains. It must be very annoying to those residents who wish for a little peace on Sunday, after perhaps a busy week in the City, to have machines constantly buzzing round their houses at low altitudes; and there is not the slightest reason why it should be done. Pilots should have a little thought for the comfort and wishes of others. I should think the aerodrome at Hendon is quite large enough for all

ordinary purposes; and even if pilots must go outside, there is plenty of country on the far side, away from the houses, where they can indulge in a little cross-country flying. Personally, I have often thought that I should not care to live in one of the houses in Collindale Avenue, owing to the amount of flying over the house-tops. Sooner or later there will be a repetition of Gibert's exploit, and a machine will sample a roof. Should this happen in the early morning, when people will probably be sleeping in the top rooms, it might mean a loss of life. Hendon is a most popular place at the moment, and it would be a pity to bring it into disrepute through a little want of thought. I hope those in power will do their best to see that the practice is discontinued.

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The peasants of Rambouillet are out to make money where possible. When the guide-rope of Commander Felix's balloon caught in a tree there the other day, and he called on them to send one of their number up the tree to release it, they began to bargain with him as to how much he was prepared to pay for the service, and

FLYING AT HENDON.

THE Second January Meeting at Hendon last Saturday was indeed like a January one, for the ground all round was covered with a white frost and it was bitterly cold. There was in addition a fairly thick fog, which rendered it impossible to hold the 16-mile cross-country handicap, down on the programme. In spite of this, however, a very successful meeting resulted, and the flying itself was rendered extremely interesting and weird by the presence of the fog which hid the aeroplanes from view except when in close proximity with the enclosures.

The fatal accident—the only one that has occurred at these weekend meetings, and the third only that has taken place at the Aerodrome itself—unfortunately marred the flying of Sunday, that extremely plucky young pilot, George Lee Temple, meeting with an untimely end at the termination of a successful exhibition flight. Temple had been away from the aerodrome for a couple of weeks laid up with an attack of influenza, and returned to his Blériot on Saturday, and took part in the day's proceedings, although still feeling far from well. It was toward the end of the afternoon on Sunday that he went up on his 50 h.p. Blériot with the intention of making but a short flight. The wind was blowing in nasty gusts of about 30 m.p.h., that made it rather unpleasant flying. After completing a few circuits of the aerodrome, executing some spirals the meanwhile, he made one of his usual nose dives when over by the railway, and was about to land, when, apparently, a gust of wind struck the tail of the machine and blew it over on its back, in which position it crashed to earth. The unfortunate pilot, who was strapped in his seat, was soon extricated from the wreckage, when it was found that his neck was broken, so that death must have been instantaneous. In G. L. Temple we have undoubtedly lost a pilot who was rapidly making his way to the front rank of aviators.

threatened, in the absence of satisfaction, to leave him and his party there all night. It appears from the report that a great search of pockets only resulted in two shillings, which was thrown down. This was not nearly enough to satisfy the rescuers, and a further search had to be made, when the amount was increased to four. One of the party then climbed up and released the rope. Four shillings between at least three people does not seem to be much cash to carry on a balloon voyage, but I suppose weight has to be taken into consideration. Money is very weighty stuff, I believe, though I have never had enough of it at one time to make much difference. In any case, it carried weight with it in this instance, and one wonders what the result would have been could that last two shillings not have been found.

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When Mr. Hawker returns to this country from Australia, he will have to search out Mr. Rutherford, of Gainsborough, and have a few words with him. Mr. Rutherford rode up to one of the hotels in Lincoln the other day on a motor cycle, and said he was Hawker, come to do some exhibition flying in the neighbourhood. He was of course immediately the hero of the place, and was introduced to all and sundry. He had great tales to tell of his flight round Great Britain, and what he was going to do in the future. So friendly did he become, that he promised to take many of the guests for a joy-ride so soon as his mechanics should arrive with the machine. Of course, there is always somebody who can't leave a poor chap alone, and the kill-joy in this case was a policeman, who turned up and arrested the giddy Rutherford for stealing the motor bike which he had hired at Gainsborough and had forgotten to return. The police found that he was in the possession of ninepence, which goes to prove the old saying, that it is not always necessary to possess money to be happy. Incidentally he said he had had over a thousand offers of marriage. Perhaps, when he has finished his four months' imprisonment, he will consider one of them.

"WILL O' THE WISP."

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FLYING AT HENDON.

On Saturday, in place of the cross-country handicap, a speed handicap was flown instead. As usual, before the racing, numerous exhibition and passenger flights were made by the Hendon aviators, amongst whom were Claude Grahame-White on the Maurice Farman, W. L. Brock on the 80 h.p. Blériot, G. L. Temple on his 50 h.p. Blériot, Marcus D. Manton, R. H. Carr, L. Strange, and E. Lillywhite on G.-W. biplanes, G. M. Dyott on the Dyott monoplane, Gustav Hamel on his Morane-Saulnier, and J. L. Hall, who flew his new Avro biplane. The race was flown in two heats of four laps each, and a final heat of six laps. The first heat was made up of the following:—L. Strange on a G.-W. 'bus (3 mins.), Marcus D. Manton on another G.-W. 'bus (2 mins. 15 secs.), Louis Noel, on the Maurice Farman (1 min. 33 secs.), and W. L. Brock on the 80 h.p. Blériot (scratch). Brock very nearly worked his way up to first place from scratch, but failed to pass Manton by 1 sec., the third man coming in 2 secs. after. There were four starters in the second heat, viz., G. L. Temple, on his Blériot (2 mins. 47 secs.), R. H. Carr on a G.-W. 'bus (2 mins. 27 secs.), G. M. Dyott on the Dyott monoplane (27 secs.), and Philippe Marty on the 80 h.p. Morane-Saulnier (scratch). In this heat Carr retained the lead throughout, and the scratch man, Marty, put up a magnificent struggle for second place, which he obtained by a bare one-fifth of a second from Dyott. The final heat resulted in a magnificent finish, all four competitors reaching home within two seconds. Brock was the first to cross the line, Marty following three-fifths of a second after, with Manton one-fifth of a second behind. Carr followed one second after Manton. This heat was extremely exciting, as all four machines loomed out of the fog in a bunch quite suddenly, although one could tell by the roar of the engines that they were close together.

Speed Handicap.	Final Heat (6 laps).	Handicap.	Time.
		m. s.	m. s.
1.	W. L. Brock (80 h.p. Blériot monoplane)...	0 20	11 40
2.	Philippe Marty (80 h.p. Morane-Saulnier monoplane) ...	scratch	11 40½
3.	Marcus D. Manton (50 h.p. G.-W. biplane)	3 42	11 41
4.	R. H. Carr (50 h.p. G.-W. biplane) ...	3 15	11 42



DISCUSSION ON "THE STABILITY OF AEROPLANES."

DURING the discussion on Mr. Leonard Bairstow's paper on "The Stability of Aeroplanes," which was read before the Aeronautical Society on the 21st inst., Mr. Harris Booth said he considered that the propeller effect was negligible except so far as side winds were concerned, but the torque of reaction from the engine when switched on and off was a more serious matter. He had made experiments with two of the models given in Professor Bryan's work on stability in aviation, and had found the two-fin model to be unstable, the flight ending in a spiral nose dive, but with the model given in Fig. 34 of that book, having one fin and a tail rudder, he had obtained consistent flights. He thought that if equations could be obtained for stability in curvilinear flight, they would do much to advance the science of aeronautics. Mr. Booth then indicated a method he had employed in launching models by the use of a box kite. The kite was sent up attached to an endless string running on two pulleys, one of which was connected to the bridle on the kite, and the other fixed to the ground. The model was attached to the string by a piece of cotton, so that when it reached the upper pulley a jerk was sufficient to break the cotton and launch the model.

Mr. T. W. K. Clarke suggested that stability might be gained by the use of devices operated by inertia, such as a bar bell set up on the axis of a machine, or by the use of the gyroscope. Mr. Handley Page gave a demonstration with a stable model, which he made to "loop the loop" when he imparted the necessary velocity to the machine: and observed that when the speed is too slow the model rises to its topmost position and then performs a tail slide.

Major Brooke Popham observed that he did not think we should ever dispense with pilot controls even with aeroplanes possessing natural stability, because of the possibility of accident should a machine be struck by a gust when near to the ground.

Mr. A. R. Low said he was very pleased to note the author's remarks on the possibilities of mathematics in the solution of stability problems, especially because of the attitude taken up by many people in regard to the paper which Professor Bryan read on stability before the British Association, and he considered that it would amply repay the Government to employ a mathematician of Professor Bryan's eminence to investigate the cause of accidents to their machines.

Mr. Busk said that he believed it was unlikely that, in the near future, we should be able to fly near to the ground without human control, and he therefore considered it as essential that all controls should be powerful enough to overcome all natural couples, since the manœuvres of landing and starting often necessitate the presence or absence of angular motions contrary to those which occur in uncontrolled flight. The opposition evinced by some pilots to natural stability was, he thought, due to the fact that unstable machines are more difficult to fly, and human nature lends one to like doing more difficult things; or else, that they lack experience of stable aeroplanes. Experiments in longitudinal stability have



THE ROYAL FLYING CORPS.

THE following promotion was announced by the Admiralty on the 22nd inst.:

Lieut. J. W. Seddon has been advanced to Squadron Commander, Isle of Grain Air Station, with seniority of January 22nd.

The following was notified in the *London Gazette* of the 23rd inst.:

R.F.C.—Military Wing.—*Inspection Department.*—Capt. Ralph K. Bagnall-Wild, retired pay, to be Inspector of Engines. Dated January 6th, 1914.

The following was announced by the Admiralty on the 23rd inst.:

Lieut. R. A. Wilson, graded as Flight Commander, to date October 1st, 1913.

ROYAL FLYING CORPS (MILITARY WING).

WAR OFFICE summary of work for week ending January 17th:

Flying Depôt. S. Farnborough.—Repair and experimental work was carried on as usual.

No. 2 Squadron. Montrose.—Three machines were taken to the new aerodrome and the work of transferring the sheds was continued by the squadron.

No. 3 Squadron. Netheravon.—Officer and N.C.O. pilots were out frequently during the week.

As previously mentioned, Sunday was very gusty, but several exhibition and passenger flights were put up by the Hendon pilots, including Claude Grahame-White and Louis Noel on the Maurice Farman, W. L. Brock on the 80 p.h. Blériot, Marcus D. Manton, L. Strange and A. Lillywhite on G.-W. buses, and J. L. Hall on his new Avro biplane. The fatal accident to G. L. Temple occurred at about 4 o'clock, Temple being the last to ascend. At the time of the accident Grahame-White was up in the Maurice Farman.



shown that a slightly stable aeroplane is not only more comfortable to fly but easier to land than one which is unstable. He drew attention to an aspect of this problem of stability which, he said, had not yet been seriously considered—namely, the loss of power involved in the side-slip necessary to right a roll. He also stated that as all stability arrangements, whether inherent or mechanical, depend on gravity for a sense of direction, side-slip was as necessary for mechanical as for inherent lateral stability.

Mr. Mervyn O'Gorman commented upon the number of patentees of various stabilising devices, and suggested that in dealing with such inventions it would be well to get the inventor to explain step by step in what manner he had been able to solve the problems of stability. It was generally thought, he said, that the machine which was the least tossed about in the air was the most stable, whereas the reverse was really the case. He pointed out that many of the difficulties arose from the fact that an aeroplane had to land, not only head to wind, but also in side winds, which placed a vertical fin system and the large dihedral angle machines at a disadvantage.

Mr. Jones observed that he had discussed this matter with a pilot friend, who strongly objected to inherent stability, and on getting at his reasons found that it was due to the fact that such machines are more uncomfortable, because they are more pushed out of their course by gusty winds. The question to be settled, he considered, was how much stability should be allowed in the machine, and he thought that this should be decided by pilots, who would bring their requirements to the aeroplane constructors. It would, he considered, be desirable to have a machine with variable stability—one that would be reasonably stable when high up.

The author, in his reply, said that it was possible to put on as much as 2,000 ft. lbs. by warping the wings, and as the steady torque of the engine generally only amounted to 200 ft. lbs. he saw no difficulty in neutralising the back torque. In regard to Bryan's equations, he mentioned that any alteration in the shape or size of the fins involved five different quantities. Mr. Booth's method of launching models from kits was good, but the study of stability was much complicated by experiments in the open, and he thought that they should first examine the conditions in still air. He said that it was very necessary to give sufficient velocity to a stable machine in order to make it perform the evolutions gone through by Mr. Handley Page's model.

In reply to Major Brooke Popham, he remarked that if a machine was inherently stable it required constant attention to prevent it from being pushed off its course. When landing a pilot had many things to do. The vertical fin system was very uncomfortable, as it was too stable, and he considered that inherent and automatic stability should be complementary, while it should be possible for the pilot to cut out the automatic gear before he lands. The author pointed out that the rudder would require to be four times the size, if they did not warp the wings.



No. 4 Squadron. Netheravon.—The squadron pilots of all three flights were out daily, and some reconnaissance work was carried out.

No. 5 Squadron. S. Farnborough.—The pilots of A and B flights carried out a number of instructional flights. During the week repair work and overhauling were continued.

Week ending January 24th:

Flying Depôt. S. Farnborough.—Experimental and repair work was carried on as usual.

No. 2 Squadron. Montrose.—The move to the new aerodrome was completed during the week—many instructional flights were carried out by the latest joined officers. Observation of submarines was also carried out on one day.

No. 3 Squadron. Netheravon.—The officer and non-commissioned officer pilots were out every day of the week.

No. 4 Squadron. Netheravon.—The officer pilots of the squadron made numerous short reconnaissance flights on B.E.'s and M.F. machines. Two B.E.'s were flown from Farnborough for use with this squadron.

No. 5 Squadron. S. Farnborough.—Many instructional flights were made by the pilots of "A" and "B" flights.

AERO ENGINES AT PARIS SHOW, 1913.

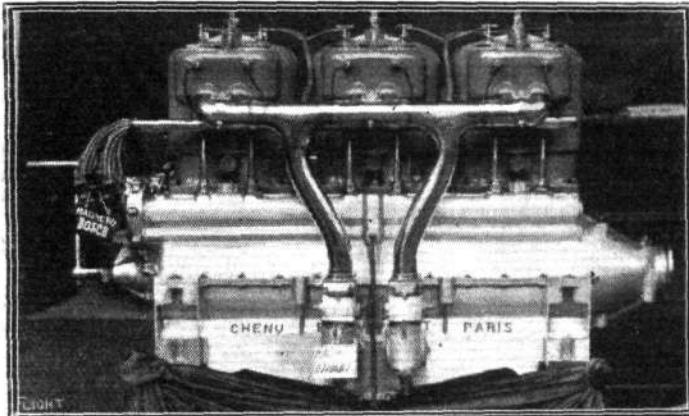
(Continued from page 98.)

Chenu Motors.

The models exhibited closely resemble the conventional car-engine. The cylinders, which are in pairs of cast iron, with the jacket cast integral with the body, are placed vertically on an aluminium crank-case. They have exceptionally large inlet and exhaust valves, which are arranged on opposite sides of the engine, while ample water spaces are provided, reaching well down the cylinder barrel. The lubricating pump, driven off the centre of the cam-shaft, is placed in a sump formed in the base of the crank-chamber, which contains sufficient oil for 10 hours running without replenishing. Bosch double ignition is fitted, one plug in each cylinder being at the side near the inlet valve, and the other over the exhaust valve. This form of ignition would appear to be essential on these engines, which run at extremely high speed, on account of the slow ignition of the charge due to the shape of the combustion chamber.

A double half compression device is fitted to facilitate engine starting, as this is especially necessary where the reducing gear is fitted. The weights of the reducing gears, which are supplied with any of the three smaller engines if desired, are 22 lbs. for the four-cylinder engines, and 31 lbs. for the six-cylinder 100 h.p. engine. Two carburettors are fitted to the two six-cylinder models; whilst the standard thrust bearing provided permits the engine to be used for a tractor screw or a propeller.

This firm have introduced a new model of the same dimensions and general construction as the old four-cylinder 65 h.p. engine which was entered as a 50 h.p. last year, but which, by the use of lighter reciprocating parts, larger valves, &c., is now able to run at a much higher normal speed. The maximum revolutions of the 65 h.p. engine is 1,800 per minute, but the 90 h.p. engine may be



250 h.p. Chenu engine.

run at 2,300 revolutions per minute. The torque curve is the same for both of these models, until after a speed of revolution of about 1,500 per minute is attained. The largest engine, 250 h.p., is intended for use on dirigibles and several have already been fitted to the Astra Torres VI, XIII, XV and XVI, besides other aircraft.

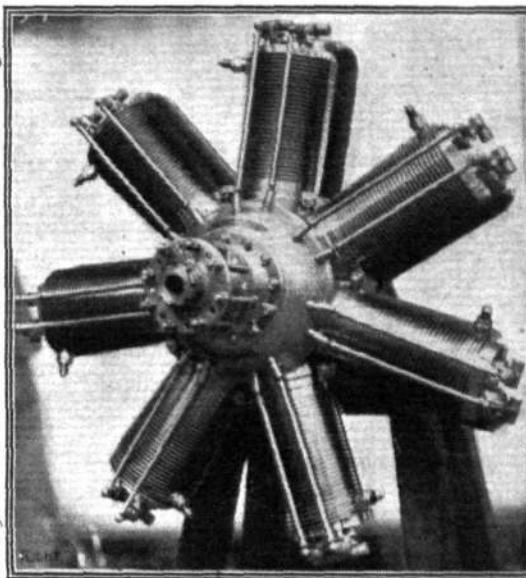
Clerget.

The new 7-cylinder 80 h.p. rotary engine was exhibited, in addition to which a 50-60 h.p. rotary engine, two vertical 4-cylinder water-cooled engines of 50 and 100 h.p., and a 200 h.p. engine of similar design to the 100 h.p., but with the cylinders arranged in vee fashion were also shown. Two carburettors and two magneto's are used with the vee engine, and one cam-shaft situated on the centre line of the engine operates both valves in the two groups of cylinders, as is usual on this type of engine, but the cam-shaft is so arranged that it may be moved axially for the purpose of varying the period of opening to inlet or exhaust.

On the rotary engines the cylinders are of steel, machined out of the solid billet, and attached to steel crank-case. Both inlet and exhaust-valves are arranged in the head, and are mechanically-operated by push-rods and rocking-levers suitably balanced for centrifugal force by counter-weights attached to the ends of the rocking levers. The exhaust-valves are placed on the leading side of the cylinders in the direction of rotation, so as to receive the maximum cooling effect, whilst the inlet and exhaust-valves in each cylinder are disposed in such a manner that their centres lie on the helix along which the head of the cylinder moves when the machine is in motion. The valve gear is operated by means of special eccentric discs, which are mounted

over the crank-shaft on ball-bearings, and have rounded projections upon their periphery. The inlet pipes are arranged radially on the near side of the engine.

The cylinders of the fixed engines are made separately of steel, and have copper jackets electrolytically deposited on them, which are provided with expansion bellows along the barrel to allow for the differences in the coefficients of expansion of steel and copper. The inlet and exhaust-valves are of the concentric type, and are



80 h.p. 7-cylinder Clerget engine.

mechanically operated through rocking-levers, the push-rods actuating the inlet-valve being inside the tubular rod which controls the action of the exhaust-valve. These valves are situated in the centre of the cylinder-head, so that the shape of the combustion-chamber is nearly hemispherical.

Forced lubrication and cooling is provided by pumps placed, as is also the magneto, at the end of the engine.

De Dion Bouton.

This engine, an 8-cylinder of 80 h.p., still retains the principal features that have always characterised it, and was illustrated in FLIGHT for November 2nd, 1912. It is air-cooled by forced induction from a fan attached to the end of the crank-shaft, which draws air around the cylinders through an aluminium casing fitted over the 90° vee between the two groups of cylinders. The cylinders are secured to the aluminium crank-case by long bolts passing through bridge-pieces fixed over the head of the cylinder. The connecting rods, two of which are attached to each crank, and the pistons are of steel, and in order to allow of the corresponding cylinders of opposing groups to be set opposite each other, the feet of the rods for the cylinders on one side of the engine are forked and fitted with bronze bushes on the crank. The big ends of the rods for the opposing cylinders fit over the bushes between the fork, so that whilst the forked set of rods function in the usual manner, the big ends of the other rods work on the exterior of the bush. On account, however, of the extremely small relative motion and the large surface provided, it is stated that very little wear takes place, even after a long period of working.

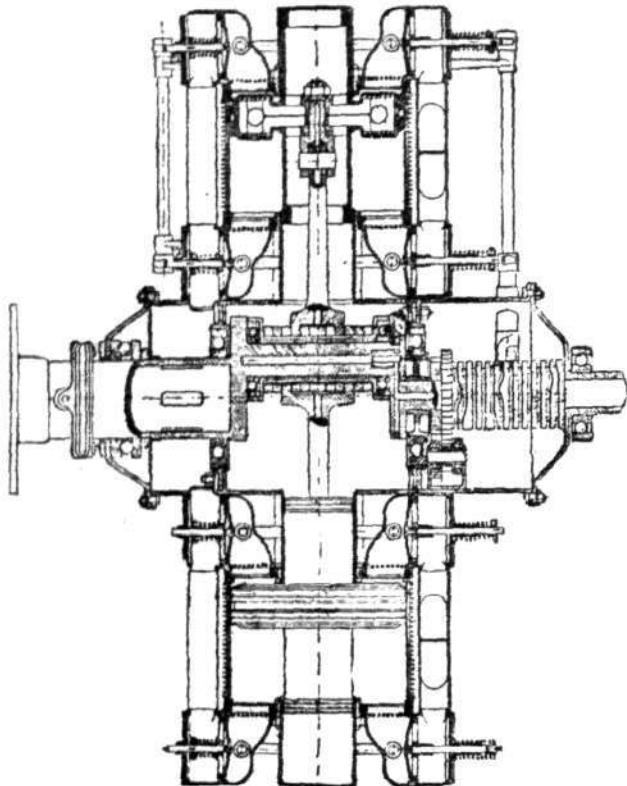
The propeller is driven off the end of a single cam-shaft, which operates the inlet valves directly through tappet gear, and the exhaust valves through push rods and rocking levers. The valves are arranged in a pocket in the cylinder on the side nearest the centre of the engine, the exhaust valve being placed over the inlet. The three intermediate bearings of the crank-shaft are lined with bronze, but to the extreme ends of the shaft ball-bearings are fitted.

The oil sump is of sufficient capacity to last for 7 hours at full speed, and the weight given in the table includes that of two exhaust collectors.

Demont.

The designer of this engine has for a number of years been engaged in the construction of various rotary motors, one of which was built as far back as 1896. The engine is a six-cylinder 300 h.p. double acting, air-cooled, rotary engine; which has, as is to be expected from such a combination, an extremely low power/weight ratio—0.73 lbs. per horse-power. Double acting engines are not of

recent introduction, and many such of the water-cooled type have been extensively employed in the United States; but the difficulty nearly always experienced with them is in the effective cooling of the piston, the leakage of gas at the glands of the piston rod and the liability of the joints in the water piping to derangement. In this engine the absence of water-cooling eliminates the last-mentioned



300 h.p. double-acting Demont engine.

defect, and it remains to be seen whether the construction employed has overcome the other troubles.

The adjacent diagram shows the general construction of the engine. It will be seen that the piston is made in two pieces, each of which is similar in shape, and both are held together by a pin bolt, to the



BRITISH NOTES

Military Aviation.

LIEUT.-COL. F. H. SYKES will lecture on "Further Developments of Military Aviation," at a meeting of the Aeronautical Society, to be held on Wednesday next, Feb. 4th, at the Royal United Service Institution, Whitehall. The meeting, which will commence at 8.30 p.m., will be presided over by Lord Sydenham, F.R.S.

Commander Seddon's Flight to Plymouth.

ALTHOUGH Commander Seddon did not arrive at Plymouth before the unfortunate submarine A7 had been located, his flight from the Isle of Grain Naval Air Station to Plymouth was a meritorious one. Upon receiving instructions, he set out from Grain, on a M. Farman biplane, accompanied by Artificer Teasdale, at 9.15 a.m. on the 21st inst. He flew round the coast, and at 11.40 a.m. was seen at Beachy Head, while at 12.30 he was sighted at Southsea. Ten minutes later he landed at Calshot Air Station for lunch. At 2.20 a restart was made; the remainder of the trip to Plymouth occupied a couple of hours. It was stated at Plymouth that although on the following day Commander Seddon several times flew over the spot where the submarine lay he was unable to discern it. On the afternoon of the 23rd inst., Commander Seddon started from Devonport to fly back to his station.

Another Sopwith for the Army.

ON the last of a batch of nine 80 h.p. Standard Sopwith biplanes ordered by the War Office, C. H. Pixton on Wednesday week, flew over to Farnborough and put it through the official tests. With the exception of the first, which was piloted by Hawker, Pixton has flown all the machines from Brooklands to Farnborough, and the times for the trip of 16 miles (*via* Guildford) varied between 8½ to 20 mins., according as to whether the wind was ahead or astern. All the machines went through their tests without a hitch, and with a good margin to spare—which is hardly surprising to

lower end of which the connecting rod is attached. Each half of the piston has two diameters, both of which are provided with piston rings, the larger diameter being that of the working cylinder and the smaller that of a trunk or guide; whilst the inner surfaces of the piston are provided with ribs for the better transmission of heat to the air by means of which it is cooled. Between the two halves of the piston is placed a baffle-plate of circular shape and having a bulbed perimeter, the function of which is to direct the air in its passage through the piston. Cooling of the piston is effected by the air, which is caused to pass radially outwards under the action of centrifugal force from the crank-case. It enters the inner end of the trunk, flows out towards the circumference of the piston, round the bulbed edge of the baffle and finally leaves the cylinder at the heads. It will be observed that the disabilities under which large pistons in high-speed engines usually labour, and which are principally due to inadequate cooling are thereby overcome, or at any rate greatly minimised.

It will be seen that the inlet and exhaust valves are placed on the sides of the cylinders, one inlet and exhaust valve being fitted at each end, as both sides of the piston operate in the usual manner on the four-stroke cycle. The exhaust valves are operated by levers attached to a shaft, at the lower end of which a projection is formed that engages with the face-cams on a sleeve placed over the crank-shaft. The inlet-valves are actuated in a similar manner, but through rods passing between the cylinders. The sleeve is rotated at half the engine speed by means of spur gearing, in which a short lay-shaft is employed to obtain the necessary gear reduction. The cylinders are provided with radiating fins, not only on the parallel part of the body and the head of the cylinder, but also upon the end within the crank-case, and all cylinders lie in a plane at right-angles to the crank-shaft.

The crank-shaft bearings, including the propeller thrust-bearing, are all of the ball type, but the construction employed for the attachment of the connecting-rods to the crank-pin should be particularly noted. Two sets of ball-bearings are fitted—one at each end of the pin—to support the bush upon which the non-adjustable forked ends of the several connecting-rods are threaded. Thus the movement of the bush relative to the crank-pin due to the rotation is entirely taken up by the ball-bearings, and any wear on the bush will be due to the angular motion of the connecting-rods.

The supply of gas to the cylinders is taken through the interior of the crank-shaft (in the circumference of which ports are cut to allow of the egress of the mixture) to a mixing chamber formed in the end of the crank-case from which pipes are led to the separate cylinders. The exhaust is expelled into the atmosphere through orifices in radial passages placed at the sides of the cylinders.

(*To be continued.*)



OF THE WEEK.

those who know the quality of the work and workmanship put in by the Sopwith Co.

Two "Wight" Seaplanes for the Navy.

IT is gratifying to record that two seaplanes, to be fitted with engines of 200 h.p., are at present being constructed in the aviation department, which is under the direction of Mr. Howard T. Wright, of Messrs. J. Samuel White and Co., of Cowes, to the order of the Admiralty.

Maurice Farman Crosses the Channel.

HAVING to deliver a seaplane to the Naval Air Station at Felixstowe, Maurice Farman decided to fly it across the Channel himself. Accompanied by Eugene Renaux he left Boulogne at 12.15 p.m. on the 23rd and overtaking the mail boat he struck the English coast at Folkestone, and then following round by Dover, Sheerness and Harwich reached Felixstowe at 2.40 p.m. This makes the third M. Farman to be delivered at Felixstowe. The machine is of 19 metres span, and is fitted with a 100 h.p. 12-cyl. motor.

Mr. Hamel at Eastbourne.

TO-DAY, Saturday, Mr. Gustav Hamel will be giving an exhibition of looping the loop at Eastbourne.

Mr. Hucks to Visit Hull.

ARRANGEMENTS have been made for Mr. B. C. Hucks to give demonstrations of looping the loop and upside-down flying at Hedon Racecourse, Hull, on Thursday, Friday and Saturday next, February 5th, 6th and 7th, commencing each day at 2.45 p.m., weather permitting.

Mr. Hamel's Match with Garros.

THE paragraph, anent a challenge by Mr. Hamel, which appeared in our last issue, came to hand from our French correspondent too late for the information to be checked with Mr. Hamel. We now learn from Mr. W. E. de B. Whittaker, manager for

Mr. Gustav Hamel, that the challenge was not an open one. Mr. Hamel challenged Garros to a match, and has received an acceptance. The match will take place at Juvisy on February 22nd.

The Salisbury Plain Catastrophe.

IT is with the greatest regret that we have to record the catastrophe which occurred on Salisbury Plain on Monday afternoon, by which Mr. G. L. Gipps lost his life, while Mr. F. W. Merriam was seriously injured. It will be recalled that Mr. Merriam was for a long time manager of the Bristol School at Brooklands, and, as we mentioned in our issue of the 17th inst., he has instructed nearly 100 pilots without any serious accident. All our readers will be with us in wishing this popular and clever instructor an early and complete recovery from his injuries, and in our condolences with the relatives of the deceased pilot.

Practically no evidence was given at the inquest, which was opened at Bulford Military Hospital on Wednesday, to show what caused the accident which led to the death of Mr. George Lancelot Gipps and the injury to Mr. F. W. Merriam. Mr. David Tod, a pupil at the Bristol School on Salisbury Plain, stated that he saw the two pilots ascend on a 50 h.p. monoplane fitted with dual control. The machine started in the direction of Fargo Wood, gradually rising to a height of about 100 ft. A lefthand sweeping turn brought it back towards the sheds at a height of 30 or 40 ft., and here there was a very sharp lefthand turn. The machine lost speed, the left wing dropped, and immediately the monoplane dived, nose downwards, to the ground. When the monoplane came to the ground, Mr. Merriam jumped out, ran a few yards, and then fell on his face. Mr. Gipps was huddled up in the machine, groaning. He was removed to the office, and died ten minutes afterwards.

M. Jullerot, who had been flying just before the accident and saw the latter part of the fatal flight, confirmed this, and added that afterwards he asked Mr. Merriam how it had occurred, and he replied, "I can't tell. Everything was going very steadily. It all came of a sudden. I think he must have interfered with my control."

The Coroner pointed out that this statement was not evidence in law, and after medical evidence had been given it was decided to adjourn the inquest for a month so that Mr. Merriam might be able to give evidence.

Edinburgh Aeronautical Society.

DURING January four meetings have been held, two given by Col. Massey of "The Aerial League of the British Empire," on "The Development of National Aviation," at which there were attendances of nearly 600 altogether; Mr. W. H. Ewen also gave two lectures on "Learning to Fly," illustrated by specially taken films; about 500 persons altogether attended these last two lectures.

A visit was also paid to the Naval Air Station at North Queensferry.

Anyone wishing to join should apply to the hon. secretary, 41, Drumsheugh Gardens, Edinburgh.

Curtiss Machines in Great Britain.

CAPT. ERNEST C. BASS, who was the first to introduce the Curtiss Flying Boats and Engines to Great Britain, and held the sole concession for them for some time, has now transferred the business to a strong syndicate headed by Messrs. White and Thompson, Ltd. of Middleton, Bognor, Sussex. This firm have greatly improved and added to their works at Bognor, where they will build improved Curtiss flying boats and organise a flying school for tuition in their use, and Lieut. J. C. Porte will be in charge of both these departments. Arrangements have also been made with a leading engineering firm in the North of England to construct Curtiss engines in various sizes up to 200 h.p.

Messrs. White and Thompson have purchased two of Capt. Bass's flying boats for use at Bognor, while the third and original machine Capt. Bass is taking to the Riviera where he intends to do some flying, from the purely sporting point of view, during the next two months.

An Australian View of Brooklands.

INTERVIEWED after a visit to England, an Australian stated: "Plenty of flying can be seen at Brooklands. They're cool customers nowadays. They bid you good-day, hop on board their machine, there's a whiz and a flutter, and your man is out of sight, all in the space of a minute or two."

A Gnome Stop-Watch.

A STOP-WATCH, specially arranged for easily securing the revolution speed of Gnome motors, has just been introduced by the Hasler Telegraph Works, of 26, Victoria Street, Westminster, S.W. It has a dial similar to the ordinary stop-watch, except that there is a special scale round the outside. All that is necessary to find the speed of a Gnome motor is to start the second-hand and then count, in the case of 7 or 14-cyl. motors, 42 pulsations of the oil-pump; then stop the hand, and its position will indicate the speed of the engine in revs. per min. In the case of 9-cyl. Gnome motors, 54 pulsations of the oil-pump should be counted before stopping the hand. The price of the watch is £3 5s. in steel case, or £3 15s. in silver case.

A Win for Cellon.

THE Britannia Trophy, which has been awarded to Capt. C. A. H. Longcroft for the most meritorious performance during 1913, adds to the list of "Cellon" successes, for this well-known dove was used on his B.E. biplane, built by the British and Colonial Aeroplane Co., Ltd.



FLIGHT

Prince Bismarck, a grandson of the first Chancellor of the German Empire, passed the necessary tests for his pilot's certificate under the new regulations on January 17th on a Fokker monoplane at Schwerin in Mecklenburg.

Prince Bismarck is only sixteen years of age, but gives promise of becoming a skilful aviator.

FOREIGN AIRCRAFT NEWS.

Gilbert after Height Honours.

ON Sunday last, at Mourmelon, Gilbert was practising on his Rhone-engined Morane-Saulnier, in view of his proposal to shortly attack the world's height record, which now stands at 6,150 metres. In this attempt he got up to 6,000 metres in 1 hr. 40 mins.

Guillaux Loops the Loop.

AFTER Deroye had tested a new 60 h.p. Gnome-Blériot at Buc on Sunday, the trial flight including a loop, the machine was handed over to Guillaux, who then took it up and made 15 loops in succession. It is stated that Guillaux is taking the machine to Australia, where he will give a series of exhibitions of looping the loop, &c.

Ae. C. F. Medals Awarded.

AT the recent meeting of the Committee of the Aero Club of France, it was decided to award silver-gilt medals to A. Seguin for his flight from Paris to Bordeaux and back, and to M. Prevost for his speed records; silver medals to E. Gilbert, C. Pegoud and Marc Pourpe for meritorious flights during the past year. Silver medals were also awarded to Jacques Schneider for balloon duration record and to René Rumpelmayer for balloon distance record.

A New Looper.

AT Buc on the 23rd inst., the Italian pilot Maniserro successfully looped the loop on a Blériot, being the fourteenth aviator to carry out this evolution on the Blériot make of machine. He also flew upside down for quite a long period while another manœuvre was the S dive.

Paris to Mourmelon on a Voisin.

FLYING when the thermometer indicated 13 degrees of frost, Rugere on the 23rd took his Rhone-engined Voisin biplane from Issy to Mourmelon in 1 hr. 17 mins.

Guillaux's Return from Bordeaux.

ON his Morane-Saulnier monoplane, Guillaux on the 22nd inst. set out from Bordeaux to fly to Paris, but he was much troubled by the headwind, and eventually had to land at Ablis about 40 kiloms. short of Paris, owing to his petrol supply giving out. The following morning, when the temperature was 12 degrees below zero, he completed the remaining short distance to Villacoublay.

Looping on a Caudron.

AT Le Crotoy, on the 22nd inst., Chanteloup on his Caudron made eleven successive loops, flew upside down and finished with a corkscrew tail slide. Subsequently he watched Poulet, also on a Caudron, loop the loop for the first time.

Champel has a Mishap.

AFTER making 1,872 trips with passengers on his big biplane, which has a 10-cylinder Anzani motor, since making his headquarters at Juvisy, Champel is at present taking an enforced rest owing to an injury received when alighting from a train. It is hoped, however, that it will not be long before he is flying again.

Farmans Land on Ice.

MAURICE FARMAN, accompanied by a passenger, and Fourny, also with a companion, on the 21st inst. made trips along the Versailles canal, and on returning to Buc alighted on the frozen surface of the Trou Sale lake, from which point they taxied their machines to the hangars.

A Blériot Among the Skaters.

ON the 23rd inst., Lieut. Quillien, stationed at Epinal, on his Blériot machine paid a visit to Gerardmer, alighting on the frozen lake. The machine naturally attracted a good deal of attention among the skaters, and, after looking at his engine, Lieut. Quillien resumed his flight.

Quick Climbing on a Caudron.

PUTTING a military Caudron biplane through its official tests before Capt. Destouches, of the French Army, at Crotoy, on the 26th, Gaston Caudron made the machine, when carrying the regulation load of 275 kilogs., climb 1,000 metres in 6 mins. 45 secs.

Another Paris to Cairo Prize.

—BARON EMPAIN, having offered a prize of 15,000 francs to the Ligue National Aérienne, the Ligue has decided to use it in connection with events it is proposed to organise this year over the Paris to Cairo route. The other prizes the Ligue propose to use in a similar way are the 10,000 francs offered by the Paris Municipal Council, 10,000 francs from Prince Bibesco, and 5,000 francs from the Seine General Council.

Hanouille in Algeria.

A FINE display of looping and upside-down flying was given by Hanouille on his Blériot at Oran in Algeria, last Sunday, the spectators numbering more than 10,000.

A Constantinople-Jerusalem Flight.

IN view of the success of the French pilots in flying from Constantinople to Cairo, it is reported from the Turkish capital that the Ottoman Government is organising a competition from Constantinople to Jerusalem. A prize of £200 will be given to the winner, while there will be several other prizes.

Marc Pourpe in Egypt.

CONTINUING his flight back to Cairo from Khartoum, Marc Pourpe, on his Morane-Saulnier went from Abu Hamed to Station No. 6 on the 21st inst. The next day he went on to Wady Halfa, and on the 23rd arrived at Berr. During this last stage of his journey the aviator was much trouble by the sand squalls, necessitating the machine being thoroughly overhauled before attempting to go on to Assuan.

Pegoud in Austria.

LAST Sunday, despite the snow and 18 degrees of frost, Pegoud gave a fine display of looping, &c., at Bruenn, Moravia, one flight lasting for 32 min., followed by another of 18 min. To-morrow (Sunday) and Monday, Pegoud will give exhibitions at Trieste, and on his application the restrictions against flying over the city have been suspended.

A German Fatality.

WHILE flying at the Schielssheim aerodrome near Munich on the 21st inst. Serjeant Schweizer fell from a height of about 30 metres and was instantly killed. The accident was caused through attempting to make too sharp a turn.

Spanish Military Aviator Killed.

LIEUT. RAMOS of the Civil Guard met his death on Monday, while flying at the Four Winds aerodrome, Madrid, through his machine from some unaccountable cause falling from a considerable height.

Testing Farmans for Italian Army.

AT Turin on the 26th inst., the Marquis de Larenty-Tholozan was testing a new De Dion-engined M. Farman biplane built for the Italian Army. With a full load of 275 kilogs., the machine was timed to attain a speed of 112 kiloms. an hour, and climbed 1,000 metres in 8 mins. 45 sec.

New Aeroplane Factory in Milan.

MR. D. LAWRENCE SANTONI has now opened and organised a large factory in Milan, principally for the construction of the Farman machines, for which large contracts have been placed by the Italian Government. There are also facilities for the sale from these works of aeroplanes generally in the Orient and South America. The firm would also be pleased to enter into arrangements with British manufacturers to build in Italy or to handle British aviation goods generally. Enquiries should be addressed to Mr. D. L. Santoni, at 9, Via Monte de Pieta, Milan, or at the London office of the General Aviation Contractors, 30, Regent Street, S.W.

The Romanoff Prize.

THE Romanoff prize of 10,000 roubles for a flight from St. Petersburg to Moscow and back within 48 hours, not having been won, Prince Abamalek-Lazarieff has announced his intention of adding the amount to the prize he has offered for a flight from St. Petersburg to Sebastopol in 24 hours. In the meantime the Imperial Russian Aero Club has asked the Prince to receive a deputation of aviators, who will suggest that the maximum period for this flight should be raised to 48 hours.

C. K. Hamilton Dead.

ONE of the first pilots of the Curtiss type of machine was Charles K. Hamilton, who died in New York on Thursday of last week from internal haemorrhage. It will be remembered that he won a prize for a flight from New York to Philadelphia and back in June, 1910. As recently as the 7th inst. he was testing a flying boat, designed on the lines of the Boland biplane, at Newark, N.J.

"Capitaine Ferber" at Work Again.

DURING last week the dirigible "Capitaine Ferber" made several long reconnaissances from her headquarters at Epinal. On Wednesday week and Saturday she was cruising over Rheims and the surrounding country.

New "Clement Bayard" on Trial.

THE new airship "Clement Bayard VI" made a trial cruise of 2½ hours with nine persons on board on Saturday, passing during the trip above Compiegne, St. Denis, &c.

Zeppelin Developments.

IT is stated that the Zeppelin Co. has decided to set aside £10,000 for the erection alongside the airship works at Friedrichshafen of a works for making hydrogen gas, and the new Zeppelin works at Potsdam, the construction of which has been begun, will also include a plant for making hydrogen gas.

PRINCE HENRY CIRCUIT, 1914.

The Prince Henry competition will this year take place, between May 17th and 25th, over a course shown in the accompanying sketch map. The first part of the programme will consist of a reliability test. The first section will be over a distance of 775 kiloms. (477 miles), to be carried out between the morning of May 17th and 8.30 p.m. of May 19th.

First Round.—Start from Darmstadt, fly over controls at Mannheim, Pforzheim, Strassburg, Speyer, Mannheim, Worms, and landing at Frankfort. Distance 400 kilom. (250 miles). Duration of stops in the Frankfort control in the discretion of the competitor.

Second Round.—Start from Frankfort, fly over controls at Wiesbaden, Coblenz, Cologne, and back to Frankfort. Distance 375 kilom. (227 miles).

The second section will be over a distance of about 1,000 kilom. (625 miles), to be completed between the morning of May 20th and 8.30 p.m. of May 22nd.

Third Round.—Start from Frankfort, fly over controls at Marburg, Cassel, Brunswick, landing at Hamburg. Distance 440 kilom. (275 miles). Duration of stop in the Hamburg control is in the discretion of the competitor.

Fourth Round.—Start from Hamburg, fly over the controls at Hanover, Minden, Herford, Münster, Osnabrück, Bremen, and return direct to Hamburg. Distance 565 kiloms (350 miles).

The second part of the programme will include a strategic reconnoitring flight from Hamburg via Münster to Cologne on May 23rd, and a military practice flight of a tactical nature near Cologne on May 25th.

Flying after dark will only be permitted in exceptional cases, to enable a flyer to reach the next control or the destination of the day's flying. No machine will be allowed to leave a control before 4 a.m. or after 8 p.m., nor will flying over controls be permitted except between 4.30 a.m. and 8.30 p.m.

Competitors will be divided in two classes, viz., military pilots, i.e., officers (on army machines) and civilians. The Kaiser prize will be awarded to that class of which the highest percentage of competitors has successfully completed both the reliability trial and the military test. The other group will be awarded the Prince Henry prize.

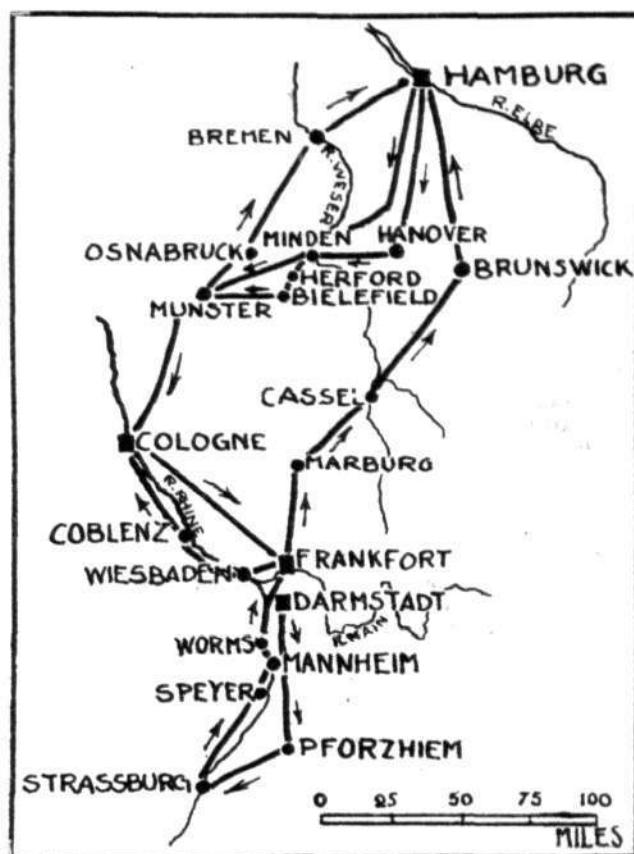
A "Prix d'Honneur" will be awarded to the pilot who has covered the reliability test in the shortest aggregate flying time, and who has successfully passed through the military tests.



CORRESPONDENCE.

The R.A.F. and the Industry.

[1828] I read the recent *Times* articles on aviation, and have kept them, and there is a lot of sound common sense in them. I must tell you that we have received every help and attention from the R.A.F., and that they have assisted us in all ways possible to execute our work. Our relations with them have been, and still are, of the most favourable nature. All they demand is that their work is well done, and on that they insist, and we do our best to satisfy them, and I may say, with some pride, that I think we have done so. It is only fair to say this, as it has been implied that all the "trade" constructors dislike the R.A.F. and its ways. What is really wanted to encourage the construction in this country is a friendly relationship between them. At present they are all trying to ruin each other. The rich firms are building machines at a dead loss in order to ultimately get all the orders, so that when they have achieved this they can demand any price they like having once got them. This is, of course, hopeless, as new firms will spring up, and again build for less. If the existing firms would fix a price between them, a fair price that would pay them and pay the Government to get them made out of the factory well and up to the R.A.F. standard, the existing firms would have no reason to grumble. The present state of the aviation trade is for the large and rich firms to try and undersell the small ones, therefore no one is satisfied, the rich firms are losing enormously, at a far greater rate than the poorer ones, and even if they succeed in bringing a few small firms to ruin, they cannot hope to keep the market to themselves long enough to get back all they have spent in reaching this end. For every penny lost by a small firm a big firm must lose ten times more at the very least. Unity means power; if the individuals are so occupied in fighting each other, they cannot have strength to fight for the cause. If they would unite in keeping aviation construction as good as possible, and in asking a reasonable price for good work, their complaint against the R.A.F. would vanish, they would get a return for all they have spent, and have time and money over for new experiments. The War Office want machines as quickly as possible, and they are therefore now build-



Altogether 71,000 mark, i.e., £3,550, will be available for cash prizes. Six prizes, amounting to 56,000 mark, will be awarded to the pilots with the shortest aggregate flying time, and the remaining 15,000 mark will be distributed among the other competitors.



ing quite a number by day and night shifts at the R.A.F., to be ready by March.

I think all these machines would have been given out to firms if they could have produced them in time, but they could not do so, because they have been so occupied in killing each other. The small firms have lost too much on each small contract to extend, the big firms have been lamenting their excessive expenditure, and the lingering life of their prey.

HEWLETT AND BLONDEAU.
per H. B. Hewlett.

Omnia Works, Vardens Road, Clapham Junction, S.W.
[We deal with this letter editorially elsewhere.—ED.]

Mr. Hucks Raises Points.

[1829] I have read with much interest the remarks of "Will o' the Wisp" in last week's "Eddies," in connection with looping-the-loop flights, but there are several points raised that I would like to see thoroughly thrashed out in the columns of your valuable journal.

Point No. 1.—Your contributor says that when Pegoud first looped the loop in this country, he took up the position that it was of the utmost importance to aviation from a scientific point of view, but that as a circus performance there was not much in it.

It has always annoyed me that aeronautical writers should refer, on occasion, to any forms of exhibition flying as "circus performances," for it seems to me, in common with other pilots, that the use of this term casts a slight upon this branch of the profession. Cannot they find some other term which is more in keeping with the prestige of aviation?

In the ordinary way there is nothing degrading in a circus performance, but it is the manner in which this term is used in connection with aviation that brings with it a certain discredit. This is all the more annoying in view of the fact that the men who specialise in giving exhibition flights do a very great deal towards popularising aviation in the provinces; and it must be remembered that the general public must be made enthusiastic about aviation before it will become possible to obtain really large grants for the development of the aeronautical departments of our Services.

Point No. 2.—Your contributor says it is a pity I so far forgot

myself as to give vent to my feelings as I did, when I saw that quite a large proportion of the public were witnessing my demonstrations from outside the grounds.

Now let it be clearly understood that I should be the very last person on this earth to deny that there is a financial aspect to these demonstrations. To be frank, I am not a man of independent means, and I have to find a method of earning a livelihood. Some people write for a living; I fly for mine. I have certain goods to sell, and naturally I wish to dispose of them in the most profitable manner. Were I not to grumble now and again about the way in which people stay outside, I really believe the general public would begin to regard it as quite the right kind of thing to do, and if everyone watched the demonstrations outside the ground, my revenue would drop to about nothing. This would mean that I should be giving my goods away, and your contributor will not have any difficulty in realising that no business would succeed under such conditions. I therefore find it necessary sometimes to say a few words to the crowd on this subject, and my remarks have invariably a tonic effect upon the attendances.

In the case of my protest at Leeds, it was remarkable how few people stayed outside the ground at the exhibition following the publication of my remarks, and I was simply inundated with sympathetic letters and postal orders, as contributions from those who had seen the flying from the roadway.

In these circumstances, I am sure "Will o' the Wisp" will agree that it was not by any means a pity that I made my protest.

January 21st.

B. C. HUCKS.

Automatic Stabilizers.

[1830] I have carefully read the article on "Automatic Stabilizers" in your last issue, and it seems to me that those who, like myself, are believers in mechanical control may well cry "Save me from my friends." I had occasion about three years ago to search through the British patents relating to this matter, and there was not one single invention (among the few which might have been workable) in which one could not almost instantly put one's finger on the weak spot, the trouble being that few of the inventors are practical engineers or mechanics, and fewer still have any practical knowledge either of flying or of aeroplanes. Under such circumstances one cannot wonder at the opposition to the use of mechanical control.

I myself hold patents for a lateral stabilizer (not of the pendulum variety), and cannot refrain from questioning such remarks as—"An automatic stabilizer . . . does not begin to work until after the disturbance in the path of the aeroplane has existed for some time." This remark is reasonable in so far as machines whose mechanism is brought into play by a variation in the attitude of the aeroplane are concerned, but it obviously does not apply to machines whose mechanism is actuated by the direct action of the air on miniature planes or wind vanes which, moving before the machine is affected (owing to their lightness), bring the mechanism into play before the pilot would have had a chance of observing the change—the matter is analogous to that of the string, the use of which you have advocated.

With all means of stabilizing, whether mechanical or due to the formation of the machine, the first essential (after reliability) is that the pilot shall be able, at his discretion, to control the machine's movement about any axis should necessity arise. So far it would appear that this being so, inherent stability is preferable to mechanical stability; but now this situation arises: what happens when landing? Inherent stability requires space for its efficient action, as also do all mechanical stabilizers relying on a change of the machine's attitude for action; if now we substitute a mechanism which is brought into play by air pressure variations, the pilot will be able to take charge on landing and bank his machine if necessity arises, being simply guarded against air-pressure variations by his stabilizer, which if properly designed need not be thrown out of action; that is to say, with a well thought out stabilizer, the pilot can give all his attention on landing to the actual business of so doing.

My experience of motor boating suggests to me that the case of the boat is not a convincing analogy, since, except perhaps under special circumstances, the pilot of an aeroplane only detects air variations by their effect upon his machine, so that it would be more correct to compare the control of an aeroplane with that of a boat on a dark night, when (though I do not, of course, suggest fitting it to boats) a mechanical control would be reasonable, the only difficulty being that the pilot of a boat may vary his control, using on a night when the sea is heavy a larger movement than when a lighter sea prevails; but it is an exceedingly simple matter really to arrange an adjustment of mechanical control with the same object.

With reference to the statement that the automatic stabilizer "increases the fatigue of the pilot, by enlarging the disturbances," this appears to apply to a machine whose mechanism is controlled by variations in its position; if it applies to the air-vane control it is merely a sign of maladjustment, and condemns the particular apparatus and not its principle.

Regarding the test at Juvisy, what stabilizer was concerned?

Longitudinal mechanical control adds some further difficulties to lateral, but with care it should, I believe, be possible to obtain it on the lines here suggested, on similar lines indeed to the Wright longitudinal stabilizer, though I do not suggest similar in details.

But experimenters must never overlook the fact that reliability, due to the uttermost care in the design of every detail however minute, is an absolute essential; and also that, at least during the experimental stages, it must be possible for the pilot instantly to disconnect the apparatus and take complete charge should he think it desirable.

For myself, I am prepared to submit any detail of my design to critical examination, and if every detail is reliable, the principle surely is worth at least a trial, since a matter of £40 or £50 would cover the expense of making and fitting the same to a machine, the only stipulation being that the machine shall have a slight dihedral to ensure its lateral stability in calm air; carelessly designed stabilizers produced by dreamy inventors have been in the past the greatest bar to the development of the same, and one cannot wonder that pilots prefer to leave such things alone.

Apologising for the length of this letter.

Southampton, January 19th.

NOEL VERNHAM.

The Small Dihedral.

[1831] I beg to make an endeavour to clear up some of the points raised by your correspondent "B 2," in letter 1820.

The dihedral angle may be fitted to any extent, providing that the efficiency of the machine is of no great importance.

The loss of efficiency is easily explained. As "B 2" is no doubt aware, the lift of an aerofoil acts at right angles to the aerofoil (viewed from the front). Suppose that the aerofoil is now inclined as in a dihedral machine. We will consider the change of the forces acting on the machine. The force producing lift is now inclined, and we must now resolve this force into two, one acting vertically and one producing a side thrust, which, in a complete machine, is counteracted by an equal and opposite force on the opposite wing.

Thus the lifting force is diminished, whilst the inward acting thrust represents so much waste work. On the modern aeroplane waste cannot be allowed. Hence the small dihedral.

A further point against the use of a large dihedral is that it promotes end losses and losses due to the sideways motion of the air outwards.

Any machine suitably designed and fitted with a very small dihedral will right itself; it is only a matter of time, no matter how launched.

No well-designed aeroplane will glide upside-down unless held so by the use of the controls by the pilot.

Your correspondent is not very clear in the next paragraph. This depends on the system used to make the machine stable. The latter portion of the paragraph only applies to a machine using the dihedral system. An explanation of the various systems of inherent stability would be out of place here.

With regard to the models, I cannot agree. I think "B 2" has made his mistake in this way. The models being so small the forces at work are small, and as the speeds are relatively high, the effects will be very difficult to detect.

The propeller idea is good, but owing to the twisted slip stream of the leader, the pitch and r.p.m. of the second would have to be modified.

This treatment might impair the efficiency as well as requiring special designing and research.

The last suggestion (regarding the motors), I assume, refers to motors of the Gnome type. There appears to be no difficulty in doing this. There is one point needing consideration; that is the necessity of placing rotating masses as close together as possible and bearings ditto, the reason for this being to obviate any stresses being thrown on shafts when the engine is moved. The advantage appears too small, as the Gnome on test has been shown to possess a very small gyrostatic couple for ordinary deflections. The magnitude of the effect on the machine depends on the design therefore to a large extent.

Bedford Park, W.

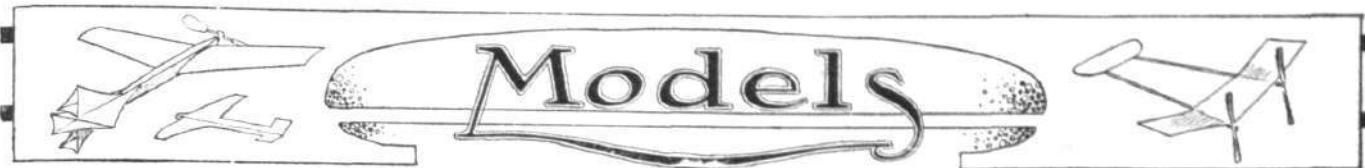
F. C. SHEPLEY-PART.

Aerial War and Parachutes.

[1832] After reading in Eddies, January 17th, that "the best way to disable airships will be to get a pilot on a monoplane to fly right into one," it went on to say "that of course this meant destruction to the pilot . . .", I do not see why the pilot should not leave the machine by parachute a few seconds before the machine strikes the airship, and so give him some chance of escape; also the monoplane could carry a certain amount of high explosives on board, so that on being flown into an airship it might do a little more than merely "disable" it.

Tunbridge Wells.

L. MARSHALL.



Edited by V. E. JOHNSON, M.A.

The Dependence of Aviation on Model Experimental Work.* By F. HANDLEY PAGE, A.F.Ae.S.
THE subject for this evening is "The Dependence of Aviation on Model Experimental Work." I will, therefore, endeavour to show you how dependent aeroplane designs are on model makers and research work carried out on models. I will also deal with the lines on which the research work must be carried out, not necessarily in the orthodox laboratory method, but even with experiments on what are sometimes termed "Flying Sticks." The experiments carried out on the latter should be of more interest than the small laboratory experiments if they are carried out correctly.

Let us consider the relations of models to the full-sized machines. The whole science of aeronautics is founded on experimental work. There are many elaborate mathematical theories which deal with the theoretical side of aviation. These theories can, however, only act as pointers in the direction to be taken; they are absolutely useless without the experimental data giving the necessary constant in the fundamental equations. Let me give you an instance.

Professor Bryan has written a book on stability, containing a long series of mathematical equations defining the stability characteristics of a machine. To properly apply this to practical aeroplane design it is necessary that a large amount of experimental work must be done to find the value of this constant. For this one has to fall back on models, and thus to properly design an aeroplane one must go back to model research work.

I have shown how important it is to the science that experimental work should be undertaken. You may say, however, that experimental work on models is uncertain in its results, and has not the same value as tests on full-sized machines. This may to a certain extent be true, but experimental work with full-sized machines can only be carried out on a large scale if you are a millionaire. It is very costly both in time and expenditure, and is attended with danger to the experimenter.

It is quite simple, of course, to make a model, having a weight in it to represent passenger, pilot, engine and petrol, &c., and let the machine fly. If it comes to grief there is no danger of lives lost nor of much time or money wasted.

You will thus see that model experimental work must be of great help to the science, although it will have to be supplemented by tests on the full-sized machines.

There are two classes of experimental work:—

1. The aeroplane is stationary and the wind blows against it.
2. The model moves, and the air is still.

In each of these classes there are two problems that confront the designer: the problem of lift and drift firstly, and the problem of stability secondly. These two problems are separate as regards the research work necessary. I will deal firstly with the experiment on the stationary model with the air blowing against it.

Experiments of this kind have been carried out in this country and abroad by many experimenters, and one recalls a long series of distinguished names in connection with this work: Eiffel, Rateau and Andre de Gaumont in France; Prandtl in Germany, Drs. Finzi and Soldati in Italy, Rabouchinsky in Russia, and in our country Dr. Stanton and his staff at the National Physical Laboratory.

These people have all employed stationary models to measure the lift and resistance of many types of planes and struts and streamline bodies. From these experiments one can tell the plane which has the maximum lift with the minimum drift, and tell how much area is necessary to lift the load which you are going to carry at the speed for which the aeroplane is designed; to tell also the thrust of the propeller, and further, the horse-power required to make flight possible. The model experiments then determine the angle of inclination, the area, and the cross section of the plane which you are going to use. There is a further series of experiments in the wind tunnel which are most useful to the aeroplane designers; I refer to the curves of pressure distribution which have been taken on many types of planes. In this one sees exactly how the pressure is distributed from the front edge to the back edge of the plane. These pressures are measured by having a series of small holes drilled across the section of the plane, and the pressure is measured with a pressure gauge connected to each of these points.

The first interesting thing that was found out from these experiments was that the lift or suction on the top side of the planes was

* A lecture delivered before the K. and M.A.A., at Caxton Hall, January 9th, 1914.

three to five times as great as the lift due to direct pressure underneath the planes. The top surface has therefore to be much more carefully designed than the lower one. These pressure-distribution curves are useful also in telling us how we may modify our cross section to obtain a better lift and a lower drift of the resistance, how we may modify the camber and cross section of our planes to improve the results.

There is another way in which the laboratory models are so useful for obtaining results for full-sized designs, and that is in the determination of the movement of the centres of pressures of the planes.

In this connection I would refer to the very careful series of tests which Mr. Turnbull carried out in 1906 at his laboratory at Rothesay, New Brunswick. At that time there was very little data to which one could refer on which to base the design of full-sized machines. Mr. Turnbull saw that it was necessary that an aeroplane to be successful must be stable in the air; when the angle of inclination decreased and the machine tended to dive, he saw that the centre of pressure must move forward to provide the necessary righting moment to bring the machine back to a level keel, and that the converse of these results must take place when the angle increased.

He experimented with planes of varying cross section of the type illustrated and numbered below.

The arrow of these illustrations shows the direction from which the wind blew, and the cross section of the planes upon which it blew. He found that the only plane which was self-righting in any way described above, was the combination of two and three obtained in section 4. For this type he took out a number of patents all over the world; but this section had already been used previously by Lilienthal, the famous German pioneer.



Experiments on this type—type 4—have been carried out more recently at Gottingen University in Germany, and by Eiffel in Paris, and Turnbull's results are fully borne out.

I have now outlined to you the scope of the experiments in the laboratory. In the laboratory the weight of the models does not matter, as these can be easily balanced on the measuring apparatus, but where in the second place the model has to fly, the weight becomes of great importance. It is here not only necessary to look at the aeronautical problems which have to be solved, but also the constructional details. If the model tests are to be satisfactory, a great number of experiments must be carried out and the model must therefore be able to withstand a great deal of knocking about. The first thing then is to design a model which is not easily smashed up.

Now as to the results obtainable from a model, and their relation to the full-sized machine.

To obtain a model which has the same stability characteristics as a full-sized machine, the flying speed of the model must be to the flying speed of the full-sized machine as the square root of the ratio of the dimensions.

Let me give you an example.

If the full-sized machine flies at 60 miles per hour, and the scale model is $\frac{1}{16}$ full size, the scale model must fly at $\frac{1}{\sqrt{16}} (= \frac{1}{4})$ of the speed of the full-sized machine, or at 15 miles per hour. This is a point where a great many experimenters come to grief. They test the model and find it wonderfully stable when it is flying at, say, 30 miles per hour. If this $\frac{1}{16}$ scale model had the same stability characteristics as the large one, the speed of this would be 120 miles per hour, at which speed wind gusts have not the same relative force.

It is easier when carrying out model flying experiments to start with the models as gliders. The propeller-driven model has to be built stronger to take the power unit, and it is, therefore, more difficult and expensive to make; there is also the propeller's efficiency, and thus, for a start, at any rate, it is easier to leave the power unit out. With gliders, one can test the lifting capacity, speed, and gliding angle for straight flights in calm air, taking different cambers and cross sections, different angles of inclination and varying plane forms to verify any flying experiment from laboratory work upon which your model design is based.

After this has been carried out, there is then the problem of determining in what way we shall place the fin areas of our body and tail so that the machine will fly steadily in gusty weather. To describe better the procedure of these model tests, I will give an account of experiments which I conducted some few years ago on models, to obtain data for the full-sized machine.

At that time the difference on planes of curved cross section was very meagre, and the tests which we made were to determine not only the stability features of the models, but also their landing power and resistance.

The models were all made of 14 and 17 gauge wire, built up into a framework with thin wire ribs. These frameworks were covered with linen tracing paper. They were mounted on a central ash stick about $\frac{1}{4}$ in. square; a solid lead weight fixed to this stick formed the equivalent of the useful load and engine in an aeroplane. The models were all one-twelfth the full size, being 30 ins. in span. We tried innumerable series of shapes and cambers, keeping the area all the time approximately the same. These experiments were not confined to planes of a special shape, but also dealt with planes of the ordinary square edge type fitted with stabilising tail planes. The camber on the planes was varied from about 1 in 25 up to as high as 1 in 6. The models were all launched by hand from the top of a mound about 35 ft. high, and the distance at which they alighted after a straight flight from the point of launching gave us the figures for the gliding angle, as we already knew the height at which they were launched. From these models we found out which had the best gliding angles.

(To be continued.)

Club Management.

Mr. O. Hamilton, jun. (Hon. Sec., Stony Stratford and District Model Aeroplane Club), writing *re* Mr. W. E. Evans' remarks in FLIGHT, January 17th, says: "I heartily agree with Mr. Evans' first paragraph, and would couple with it his sixth, dealing with a secretary's 'visiting duties,' and would emphatically state that a club's sound standing is all based upon an energetic secretary, and as I, for one, lack that feature, I can write it and feel I am not blowing my own trumpet on the subject."

Secondly, and in a parallel paragraph to the article in question, is the question of subscription. Speaking from my own efforts in club control, I feel safe in asserting that you cannot advocate or even fix a minimum rate of subscription, especially one in the neighbourhood of one shilling a month. To give an example: when my own club was in process of formation, five shillings was suggested as the annual subscription. My current chairman, speaking from long experience of other societies and clubs in the district, proposed at the inaugural meeting that the subscription be half-a-crown annually, and this is the rate we have fixed. It has the drawback that Mr. Evans suggests, but every cloud has a silver lining, and our way out of this difficulty is to allot so much per month for competitions, and charge a small entry fee to the competitors. We have had no complaint from our present members, who would willingly pay a higher subscription, but if we are to interest a large circle, we must keep our rate low. In addition to the seniors' rate of 2s. 6d., juniors are admitted at 1s. annually. We are so fortunate as to possess two fields at Stony Stratford and one at Buckingham, which we can use rent free; but to counteract this we have rental for three rooms—one at Stony Stratford, one at Wolverton, and one at Buckingham.

"Re club workshop, in a country district like ours there is not such a great need for one as in certain other instances. Mr. Evans' suggestion *re* open competitions is very good, and if, in the future, our members get more heart and faith in their abilities, we may carry it into practice."

"Just one more word on the subscription question, which clearly shows our difficulty in this district. In April, 1912, we held a kite competition for juniors—an open event—and when the winner came along with his father to draw the prize money, the father, on parting, said: 'I wish you could lower your subscription; it's a lot for a mechanic to have to pay for a club.' My reply was 'that it was a physical impossibility to run the club on fresh air, or we should be pleased to oblige.' Truly, I thought this was the last straw."

Mr. G. Crooke-Rogers' Machine.

The following are the chief particulars of this machine which won the Birmingham Aero Club's Championship Shield:—

Length, 40 ins.; triangular frame; span, 30 ins.; chord, 6 ins.; elevator, 10 ins. by $2\frac{1}{2}$ ins. mounted above the framework; propellers, $11\frac{1}{2}$ ins.; diameter, 11.5 ins.; pitch, 24 ins.; number of strands of rubber a side, 8 of $\frac{1}{4}$ in. strip; weight of rubber, 1.75 ozs.; weight of machine, 4 ozs.; total weight, $5\frac{1}{2}$ ozs. Main plane constructed of steel piano wire, gauge 18. A centre spar of bamboo is fitted at the top of the camber. The rear edge is very flexible and appears to give added stability to the machine. It does not roll in flight



Photo, by Mr. T. Lockhead.

The Birmingham Aero Club's Championship Shield winner.

at all, but when struck by a side-gust banks and recovers. The propellers are steamed ones.

More Records.

"With reference to the remarks *re* quick-rising models, by Mr. Tinson, in your issue of January 3rd, I do not think," writes Mr. G. C. Beeching (Ealing), "that this distance is a record for models, as one occasionally sees a model get off in a foot or so by a fluke. However, I have made some experiments with a small model, 12 ins. span and of the same length. I had no French chalk for putting on the rising board, which was, of course, indoors, and so I had to use common salt, which impeded the travel of the model somewhat, but the wheel tracks of the model showed very clearly. The five shortest successive runs were as follows: 19.5, 31, 18, 23 and 15 ins. respectively, the shortest being thus only 1.25 times the length of the model.

The motive power was 3 strands of $\frac{1}{8}$ in. rubber driving twin 4 in. propellers of coarse pitch."



KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.			
Single screw, hand-launched	Duration	D. Driver...	... 85 secs.
Twin screw, do. ...	Distance	R. Lucas ...	... 590 yards.
Single screw, rise off ground	Duration	G. Hayden ...	... 137 secs.
Single screw, do. ...	Distance	W. E. Evans ...	... 290 yards.
Single screw, do. ...	Duration	W. E. Evans ...	... 64 secs.
Twin screw, do. ...	Distance	L. H. Slatter ...	... 365 yards.
Single-tractor screw, hand-launched ...	Duration	J. E. Louch ...	... 2 mins. 49 secs.
Do., off-ground ...	Distance	C. C. Dutton ...	... 266 yards.
Single screw hydro., off-water	Duration	J. E. Louch ...	... 91 secs.
Single screw, do., do. ...	Duration	C. C. Dutton ...	... 190 yards.
Single screw, do., do. ...	Duration	J. E. Louch ...	... 94 secs.
Single screw, do., do. ...	Duration	L. H. Slatter ...	... 35 secs.
Single-tractor, do., do. ...	Duration	C. C. Dutton ...	... 29 secs.
Twin screw, do., do. ...	Duration	L. H. Slatter ...	... 60 secs.

Wireless Kite Section.—This section during the week-end carried out some interesting experiments with their amateur outfit. Will someone interested come forward and present the section with a good portable station? The hon. sec. will be pleased to give full details, &c., of outfit needed.

Competitions for Kites and Models.—Will any members who have suggestions for competitions kindly forward them to the hon. sec. so that he can lay them before the Secretaries' Guild and the council.

Farrow Shield.—This challenge shield has been received from Mr. Thomas Farrow, and it is hoped to exhibit same in a prominent West End window during February, and to publish photo. of same in this paper. This shield and all trophies will be exhibited at the Aero Exhibition in March. All holders are therefore asked to return same to the hon. sec. by the end of February for this purpose. Any one wishing to give a trophy should therefore present same at once, so that the aeronautical world shall have the pleasure of seeing.

Nominations, &c.—The hon. sec. will be pleased to receive any nominations for the presidency, &c., for coming year, so that the council can go through them at their next meeting. Already several gentlemen have been nominated as vice-presidents, vice-presidents, &c.

27, Victory Road, Wimbledon.

W. H. AKEHURST, Hon. Sec.

AFFILIATED MODEL CLUBS DIARY AND REPORTS.

CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Aero-Models Assoc. (N. Branch) (27A, SEDGEMERE AVENUE, EAST FINCHLEY, N.)

JAN. 31ST, flying Finchley, 3 p.m.; Feb. 1st, 10 a.m.

Monthly Report.—Interest for the past month has centred on the change of secretary and committee. Mr. Hindsley's resignation has been received with great regret, he having done a great deal of good work for the club. Mr. T. W. Dann is the new secretary, and the committee is as follows: Messrs. Hindsley, Fletcher, Ross, Cauder, and Rogers. An indoor meeting was held at "The Cabin" Jan. 22nd. Flying meetings were held Jan. 10th, 11th, 17th, and 19th, those flying being E. Colman, 0-1-1-P, good glides, about 40 secs.; Mr. Clafin, 1-1-0-P₂, 4 oz. machine; Mr. F. G. Hindsley, speed machine incorporating inherent instability; Root, tractor, 30 secs., bow frame; Mr. Wilson, very fast 8 oz. tractor (100 yards).

Bristol and West of England Aero Club (Model Section) (42, ROYAL YORK CRESCENT, CLIFTON, BRISTOL).

MR. C. W. TINSON has resigned his office of official observer, and Mr. N. Gordon Stephens has been elected by the committee (subject to the approval of the K.M.A.A.) to fill the vacancy *pro tem.* until the annual general meeting. Model flying meetings will be held at the Sea Walls every Saturday at 3 p.m. Members who have not yet paid their subscriptions to the hon. secretary should do so as soon as possible.

Monthly Report.—The R.F.G. duration competition commenced on Nov. 22nd, was concluded on Jan. 3rd, the winning flights being: First, R. T. Howse (1-1-2 P), 50 secs.; second, W. A. Smallcombe (1-1-2 P), 46 secs. The competition in this event was very keen, and the winning flight of 50 secs. r.o.g. was made at dusk on the day when the contest closed. The prizes were presented to the winners at a general meeting on Jan. 14th. A flight golf competition was held on Jan. 17th, when Messrs. R. T. Howse, E. Martin, W. A. Smallcombe, and N. Gordon Stephens competed. Mr. Smallcombe's machine (a twin-screw "canard" model with a pronounced dihedral angle) landed in the 20 ft. circle in five straight flights, and the prize was awarded to him. On Jan. 24th, high flight of 65 secs. duration was made by a twin-screw tail type model flown by Mr. Smallcombe. The wings were flexible, and of modified "Weiss" design. This flight was chiefly remarkable for the reason that the backswept flexible wing tips flapped rapidly up and down in flight actuated by wind pressure. If this natural flapping could be artificially assisted there is no doubt that the machine would thereby be propelled forward. At these meetings the hon. sec. has been experimenting with his steam-driven Weiss model, but no flights have yet been made under engine power. The machine has made short flights driven by a geared rubber motor (the weight being then 22 ozs.), and towed behind a bicycle with the engine on board (total weight 32 ozs.), it has left the ground at a wind speed of approximately 20 miles an hour. The dimensions are: Span, 4 ft.; chord, 6 ins.; length, 3 ft. 6 ins.; weight (machine 15 czs., engine and fuel 17 czs.), 22 ozs.; effective lifting surface, 180 sq. ins.; loading, 25.6 ozs. to the sq. ft. (the loading when the machine rose from the ground driven by one of Bonn's geared motors was 17.6 czs. to the sq. ft.). The wings are modelled on those employed on the Keith-Weiss "aviette."

Croydon and District Ae.C. (158, HIGH STREET, CROYDON).

Monthly Report.—Very little flying during January owing to work with Show models. Those members that have been out during January have certainly favoured tractor models, and with the exception of Messrs. C. Smither and W. Bell, who have flown hand-launched models, no other type of model has made an appearance. Messrs. Bell and Smither had some of the finest distance flights yet seen at Mitcham, Mr. Smither's model climbing to a fine height. Mr. H. Smither has been out with a very original tractor monoplane and Caudron type planes. He has had very good flights, and the model is very stable. Mr. Bell, with a small tractor, has been out for height, and his model has proved itself a good climber. Messrs. Hart and Mullins have also had good flights with their Dep.-type models. Mr. F. Carter has had out the smallest tractor mono. we have yet seen, and has succeeded in getting it to fly very well, though its landings are somewhat abrupt. Mr. Pavely has been out tuning up his tractor model intended for Olympia.

Leytonstone and District Aero Club (64, LEYSFIELD ROAD).

FEB. 1ST, at 10 a.m., meet on Wanstead Flats as usual; if wet meet at club-room.

Monthly Report.—Jan. 4th, meet of the members on Wanstead Flats. Mr. H. Bedford opened proceedings with a small tractor, which flew well. Messrs. S. C. Herson, F. Wood, and F. Hawthorn were all obtaining good duration with r.o.g.s., and six h.l. models were flown during the morning. Jan. 11th, in spite of a gale, 20 members assembled, and Mr. Thos. Kimpton obtained the best flight of the morning, 100 secs., h.l. The model travelling with the strong wind was lost over some houses fully half a mile distant. Other h.l. models were flown by Messrs. H. Frost, G. Pitt, W. Herson, and F. Wood. Messrs. H. Bedford and F. E. Grattan were each obtaining good flights with tractors; r.o.g.s. were flown by Messrs. S. C. Herson and F. Wood, while Messrs. J. E. Louch and H. Bedford vied with each other for hydro. honours. Members are beginning work in earnest on exhibition models, as can be seen by the falling off in attendance. Only 18 members turned out on the 18th, but some good flying was the result. Messrs. S. C. Herson and F. Wood accounted for the hydras., and r.o.g.s. were flown by Messrs. F. Hawthorn, F. Wood, and S. C. Herson; six h.l. models were also flown with varying success by different members during the morning. Jan. 25th, Messrs. F. Wood and H. Bedford, arriving with hydras., were confronted with the difficulty of getting them off ice. Mr. Bedford detached his floats, and hastily fitted runners, from which his model rose very easily (ice makes a splendid rising surface). Messrs. F. Wood, S. C. Herson, H. G. Bond, W. Herson, and F. Hawthorn arrived with r.o.g.s., Messrs. Thos. Kimpton and F. Wood with h.l., and Mr. Frank Hawthorn with a small tractor. Weather conditions throughout the month have been very unfavourable.

N.E. London Model Ae.C. (47, JENNER RD. STOKE NEWINGTON, N.)

Monthly Report.—Saturday afternoon's interest has centred chiefly round Mr. Burton's 5 ft. span r.o.g. tractor. Mr. Longstaffe's scale 14-oz. tractor has been doing exciting "straights." At general meeting for reorganising club on Jan. 17th, Mr. Longstaffe was elected hon. sec., Mr. Burton treasurer and assistant sec., with the following committee: Messrs. Lewin, Dore, Griffett, Sutton, Cowdry, Sherratt, and Wood. The annual subscription was fixed at 4s., a certain amount of which is to be devoted to prize work. Applications are invited for membership. A hydro. meeting on Sunday morning is to be inaugurated, if sufficient support is forthcoming; members are asked to inform

the hon. sec. whether they are willing to support such a meeting. A club stand has been reserved at Olympia, and several members who intend exhibiting have already commenced on their machines.

Paddington and Districts (77, SWINDERBY ROAD, WEMBLEY).

JAN. 31ST, flying at Sudbury. Competitions for Aero Show models commence.

Monthly Report.—Jan. 3rd, C. C. Dutton with h.l. twin-screw flew six timed flights, ranging from 73 to 89 secs.; W. Evans single-screw r.o.g., five ranging from 40 to 61 secs. Jan. 10th, showery; flying by F. W. Johnson (twin-screw r.o.g.), M. Levy, C. Levy (h.l. twin-screw), W. Evans (single screw r.o.g. with double-surfaced plane and elevator). At conclusion, members journeyed to secretary's house, where tea was provided prior to annual general meeting. Other members having arrived, the secretary, W. E. Evans, commenced the business of the evening by reading the report and balance sheet. These two documents, copies of which were handed to every member, show that last year was by far the most successful, both practically and financially, since the club was formed in June, 1910. The chief successes were due to the energy and perseverance of Mr. C. C. Dutton, who won two trophies in open competitions, also two gold medals, four silver-gilt, two silver, and two bronze medals. Mr. A. Cannell won one trophy, including silver plaque, in open competition. Other members who distinguished themselves in such competitions were Messrs. R. Bird and T. Carter. Six British model records were secured by that club, Mr. C. C. Dutton holds three, Mr. W. E. Evans two, and Mr. D. Driver one. The balance sheet showed cash in hand, £1 7s. 3d., after spending £8 2s. 6d. in prizes. Fifteen medals were awarded during the year—namely, one gold, nine silver-gilt, two silver, and three bronze. £2 6s. 3d. was devoted to cash prizes. In inter-club contests the club held their own in matches with two of the leading London clubs. The officers of the club elected for the ensuing year were: President, Mr. Alfred Perkins; hon. sec. and treasurer, Mr. W. E. Evans; committee of management, Messrs. R. Bird, M. Canning, T. Carter, F. Johnson, M. Levy, and H. Woolley. Now is an excellent time for new members to join. Entrance fee 1s., and subscription 1s. per month.

Reigate, Redhill and District (THE COTTAGE, WOODLANDS AVENUE, REDHILL).

JAN. 31ST, flying as usual, Earlswood Common.

Monthly Report.—The chief work during the month has been done in the workshop, members being hot on machines for the forthcoming Show at Olympia. The flying has been of an experimental character, Messrs. Sutton and Norton having been experimenting a good deal with tractors. A tea and general meeting was held on Jan. 17th, and a very pleasant evening was spent in combining pleasure with business. The officers of the club were re-elected *en bloc*. It was found that the club stands in a good financial position, and a very gratifying report was read. On Jan. 21st the club r.o.g. record was broken by Mr. R. G. Wilson, he having obtained 56 secs. with 6-oz. floating tail mono. and a point-to-point distance of 389 yds., the record being for duration. Mr. Sutton has had a h.l. floating tail out, getting very stable flights; also 8-oz. tractor mono. with Handley Page type plane. This has proved to be very stable, behaving excellently in side winds. With this he has been experimenting with different types of tail, also tractor screws; the best results having been obtained with non-lifting tail with negative flaps. Mr. Hoyle has been out with 2-oz. r.o.g., also h.l. mono., both very good. The Wilson family have been busy with r.o.g.s., their chief event being 56 secs. with floating tail; they have also had a 12-oz. r.o.g. "parasol" mono. which gives great promise, having had 42 secs. off ground and 46 secs. hand-launched. With a r.o.g. mono. loaded 9 oz. to 1 sq. ft. they have had 309 yds. and 36 secs., and r.o.g. biplane loaded 6 oz. to 1 sq. ft. 32 secs., about 80 ft. high. Mr. Hooton has been out with 8-oz. r.o.g. mono. and 10-oz. r.o.g. biplane with usual good flying. Mr. Funnell has had a 10 oz. r.o.g. mono. loaded 5 oz. to 1 sq. ft. This is the first machine of a new member, and certainly gives him great credit; he obtained 200 yds. with the first flight, but further trials were ended by a rubber breakage. Mr. Greenhead has been out with 7-oz. r.o.g. mono. and h.l. mono., getting 45 secs. with latter. Mr. Norton has been out with 9-oz. tractor mono. with Etrich type plane; this rode a nasty east wind well, crabbing on side wind, and steady as in calm. Messrs. Kennard and Young have also been flying.

Sheffield Ae.C. (41, CONISTON ROAD, ABBEYDALE, SHEFFIELD).

FEB. 7TH, at 3 p.m., general meeting at Broomhead's, Leopold Street, when important announcements will be made. All members and those interested in aviation invited to attend. Please observe change of secretary's address.

Stony Stratford and District Kite and Model Ae.C. (OLD STRATFORD).

STONY STRATFORD AND WOLVERTON, Feb. 4th, discussion meeting at Wolverton. Feb. 16th, building evening at Stony Stratford. Buckingham Branch, Jan. 30th, discussion meeting. Feb. 14th, building evening. Feb. 27th, discussion meeting. Feb. 21st, members competition for both branches at Buckingham at 2.45 p.m.

Monthly Report.—Stony Stratford and Wolverton, Jan. 7th, general meeting at Wolverton. Subject for discussion, "The Competition Classes at Olympia." It was unanimously resolved that the club become affiliated to the K. & M.A.A. Owing to one or two spectators being struck by models at competitions, it was resolved to include the Association Rules re Protectors in the club rules. It was unanimously resolved that a vote of thanks and appreciation be recorded to the Model Editor of FLIGHT, Mr. V. E. Johnson, for his appreciative paragraph. Jan. 17th, on club ground at Old Stratford, a distance competition was held. Results calculated on average of three flights were: Messrs. E. Brown and W. Palmer, 1st, tied with average of 87 yards; Mr. E. Brown, 2nd, with average of 69 yards; Mr. R. Elmes, 3rd, with average of 64 yards. Jan. 31st, at Stony Stratford, a building evening was held, members present overhauling machines.

Buckingham Branch.—Jan. 9th, members' meeting. Subject, "Some Points on Model Design." Jan. 16th, building evening—Single-propeller machines on the stocks and gliding experiments. During the month members attended a lecture at Padbury given by Lieut. Lawrence, R.F.C.

Wimbledon and District (165, HOLLAND ROAD, W.).

JAN. 31ST and Feb. 1st, flying as usual.

Monthly Report.—Not much flying during past month, members being busy on their Olympic machines. Several new machines have been out, the most noteworthy being two large tractors flown by Messrs. Tucker and Laing respectively. Mr. Tucker's machine is on the lines of the "Martinsyde" monoplane, which it resembles in the chassis and in the planes, which taper towards the tips and are braced from a king-post in the centre. The machine gets off and flies well, though it has a tendency to stall at the end of the flight. Mr. Laing has had out his reconstructed "D.F.W." monoplane, weighing 11 ozs., the built-up fuselage now being replaced by a hollow spar of large section. The model is very stable, and the duration has been improved up to 30 secs. Mr. Easdale has flown his large tractor every week, and continues to improve on his previous results. The stability is excellent, and the duration has been increased by the use of a larger screw, the average being about 40 secs. A machine which flies

very well in a wind is Mr. W. G. Smith's 3 ft. A frame, type 1-1-0-P₂; it gets up to a great height and covers about $\frac{1}{4}$ mile every time. Unfortunately at the conclusion of a long flight of about 600 yds. it was annexed by some urchins who decamped before Mr. Smith could arrive. It has not been recovered. Mr. Laing has flown an A frame twin-screw type 1-1-0-P₂, getting very high flights and durations up to 65 secs. He has also made some interesting experiments with his large tractor as a glider. On a line of 30 yds. in length the machine rises into the wind and soars at a height of 40 ft. for periods of 2 mins. Mr. Cunningham has had out his Olympia-type tractor with built-up fuselage. The machine made several short flights, but further experiments were stopped by the screw coming off in mid-air. Mr. Hayden has flown his 4-ft. 9-in. bus throughout the month. It is now fitted with a larger elevator which has improved the flight considerably. Mr. Boniface's single-screw pusher has been flying well, both r.o.g. and h.l. doing durations up to 40 secs. It was originally fitted with an elevator, but this has now been replaced by a tail, and the stability has greatly improved in consequence. Mr. Powell has flown his hollow spar type 0-1-1-P₂ machine, getting good results in all weathers; average duration 80 secs. On one occasion it alighted in a pond at the conclusion of a long flight, and had to be retrieved with a line, none the worse for its bath however.

UNAFFILIATED CLUBS.

Edinburgh Ae. Soc. (Model Section) (13, HERMARD TERRACE).

PRACTICES Feb. 7th, King's Park; Feb. 14th, Blackford Hill Observatory; Feb. 21st, Braid Hills, Pond Gate; Feb. 28th, r.o.g. duration sweepstakes in meadows; all practices commence at 2.30 p.m. Lantern lecture on "Some Points on Model Aeroplane Construction and Design," will be given by Mr. S. Harrison, at 46, Torphichen Street, on Thursday, Jan. 26th, at 8 p.m.

Monthly Report.—The first Scottish Model Aeroplane Championship Meeting was held on Jan. 1st, at Edinburgh, when competitors from Glasgow, Dundee, North Berwick, and Edinburgh took part. Unfortunately, owing to a strong wind, only one new Scottish record was put up, namely: r.o.g. distance, 262 yards 2 ft. by Mr. Craig Boyd, S.A.S. Model Aero Club, and which was done in the inter-club competition. In the inter-club competition each club was represented by h.l. monoplane, h.l. biplane, and r.o.g.; each machine made three flights in both distance and duration, and scoring was by points. The following were the results:—Open competition (distance)—1. S. Harrison; 2. E. Hardy; 3. H. Hartley. Open Competition (Duration)—1. J. P. Graham; 2. S. Harrison. R.O.G. (Distance)—1. J. P. Graham; 2. S. Harrison. R.O.G. (Duration)—1. J. Hall; 2. J. Graham. Inter-club Competition—1. Edinburgh, 34 pts.; 2. Glasgow, 28; 3. Dundee, 22; 4. North Berwick, scratched. On Jan. 24, a few members went down on the invitation of Major Gordon to Port Laing to inspect the seaplanes stationed there.

Finsbury and District (52, LAMBTON ROAD, HORSEY RISE, N.).

FLYING as usual, Finsbury Park (kite ground), from 3 p.m. till dusk.

Ilford Model Ae.C. (83, ENDSELEIGH GARDENS, ILFORD).

FEB. 7TH, 14TH, 15TH, 21ST, 22ND, AND 28TH, FLYING AS USUAL. ON FEB. 4TH, COMMITTEE MEETING; FEB. 9TH, GENERAL MEETING TO DISCUSS THE BUILDING OF A CLUB GLIDER.

Monthly Report.—There has not been very much flying this month, for the club has just been reorganised, and programme for 1914 planned. The best performances have been made by Mr. R. C. Nicholls and Mr. B. Seabright. It is to be regretted there has been a marked absence of tractors. Biplanes seem, however, to hold a prominent position, most of them being r.o.g.s. The best performance was put up by Mr. G. Warren with 35 secs. duration. The secretary is going to experiment on Rochet planes, which were illustrated in the back numbers of FLIGHT. Mr. Nicholls put up a very good performance with his "light weight" twin-screw "pusher," which weighs less than 2 ozs. His performance being the club's record for the "light weight class," 41 secs. duration obtained on Jan. 18th. There is only one hydro-biplane in the club at present, owned by Mr. G. Warren, which has flown with fair success. The secretary's twin-screw "pusher," with backswept wings *à la* Handley-Page, caused quite a sensation. It flew very well, and was exceedingly stable fore and aft, but was inclined to wobble, for the wings were turned up too much. From the end of January onwards tractors will receive most encouragement, as they are so much in the minority, and also are more difficult to construct. The secretary would be exceedingly pleased to receive catalogues, &c., from model and accessory manufacturers, and also from aero-model enthusiasts who would care to join the club.

Scottish Ae.S. Model Aero Club ("ROCHELLE," LIMESIDE AVENUE, RUTHERGLEN).

JAN. 31ST, FEB. 14TH AND 28TH, Paisley Racecourse, h.l. and r.o.g.

Monthly Report.—Dec. 20th members visited Paisley Racecourse. Several new models were out, including Mr. Mills' new hollow spar biplane, 0-1-1-P₂, and Mr. Balder's new duration model, 1-1-0-P₂, whose best durations were 65, 68 and 78½ secs. Jan. 1st members travelled through to Edinburgh to compete in several competitions organised by the Edinburgh Aero Club, and also to compete in an inter-club match for the championship of Scotland. Teams of three members (each flying a different type, namely, h.l., r.o.g., and h.l. biplane) were forward from Edinburgh, Dundee and North Berwick. Unfortunately the weather was rather boisterous, and was all against good flying. Owing to this a good many smashes took place. The result of the match was: 1. Edinburgh; 2. S.A.S.; 3. Dundee; 4. North Berwick. During the day Mr. W. Craig Boyd, S.A.S., raised the Scottish distance record for r.o.g.s. to 262 yds. On Jan. 28th Mr. James G. Gray, D.Sc., will deliver a lecture entitled "New Gyroscopes and their Applications," to the Scottish Aeronautical Society, in the Glasgow University, at 8 p.m. All interested are invited to be present.

S. Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).

JAN. 31ST, Woolwich Common, 3.30 p.m. until dusk; FEB. 1ST, Blackheath, 7.30 to 10 a.m.; Lee Aerodrome, 10.30 a.m. to 12.30 p.m.

Monthly Report.—Owing to the Exhibition, the past month has been one of exceptional industry, and a record number of models have been completed. In addition to the ordinary flying models, F. Plummer has built a scale Morane-Saulnier mono., A. B. Clark a scale Blériot, W. R. Prance a petrol motor, and Mr. Hook a steam plant. This Exhibition, held at the Central Hall, High Street, Peckham, on Thursday last (20th), will be reopened at the All Saints Men's Club, Rippin Road, Herbert Road, Plumstead, on Thursday next (Feb. 5th). Aero-modellists and their friends are heartily invited. Admission free. Visitors will be entitled to cast a vote for the most interesting exhibit, which will hold the "South-Eastern Trophy" for the present quarter. The next contest for the trophy, the rules for which appeared in these columns last week, will be held on Feb. 28th. G. H. Westwood has spent a very busy month with his numerous tractor monoplanes. A. Beere has developed a similar stud, but on a much smaller scale, and has also tackled a tractor biplane. C. Beere's monoplanes have been well to the fore, and show considerable promise. A. B. Clark's all-metal model is still looping merrily, and now does three consecutive perfect loops without any effort. F. Plummer's hollow-spar mono. maintains its high style of flying, and G. Brown has now reverted to a small

single-propeller model. E. W. Brunton has flown a promising tractor, and A. D. Nicholls his very efficient hollow-spar monoplane. It is with mingled feelings that one announces that A. F. Chinery has now apparently forsaken his realistic gull's wing tractor for the "hollow spa brigade," and now flies a very creditable specimen. F. Dixson is experimenting with a Dunne-type glider, and Mr. Bennett with a twin-tractor. This member has also had good flights from a floating tail "A" frame, and F. W. Edwards has flown a very promising twin-gearied tractor fitted with an electric searchlight and a twin-propeller biplane.

Twickenham Model Ae.C. (74, CLIFDEN ROAD, TWICKENHAM).

Monthly Report.—During the early part of the month Messrs. Hill and Clayton did some exceptionally good tractor flights, R. Hill with one making the club record of 176 yds., although the machine lost a lot owing to circling. Saturday, 10th, Mr. Stagg brought down a Dunne-type mono. and also two tractors, one modelled on a Clarke's Dep., another of his own design. A competition was held for flying-sticks, the winner being the one who had the greatest total when his duration and length were multiplied together. Mr. Franklin, jun., was winner, with Mr. Ord as runner-up. Jan. 17th, the tractor competition was to be the main feature, there being ten entries. But the weather turned out abominable, so that the competition was declared off. On 24th Messrs. Hill, Clayton, Franklin, jun., Whyte, Rice-Skinner, Stagg, Williams and Harries out with tractors, and Messrs. Ord and Whyte during week-end with flying-sticks. Mr. Franklin, sen., has kindly accepted the presidency of the club, which has met with unanimous approval, as he and his son have shown such enthusiasm in the welfare of the club. The members who have joined during the month include Messrs. Ord, Whyte, Stagg, Williams and Harries. Messrs. Franklin and Taylor are offering prizes, and together with those already given should do much to stimulate members to do their utmost. So taking things all round the club should be looking forward to a successful season this summer.

Windsor Model and Gliding Club (10, ALMA RD., WINDSOR).

Monthly Report.—The usual flying has been done this month. One or two models have been of more than ordinary interest. Mr. Rogers' big monoplane, 6 ft. span, has undergone some tuning-up flights, and shows great promise. It will be remembered that it was exhibited at the *Model Engineer* Exhibition, but has since undergone some little alteration. Mr. Stanbrook has flown a big 12-oz. tractor-biplane with great success, and a feature of which is the stability in a high wind. Mr. S. Camm has flown a tractor monoplane, reaching big altitudes. Messrs. F. Camm, S. Spicer, S. Dandridge, H. Dellar, and J. E. Staines have flown various models. Most members are now engaged on the models for Olympia, and it is hoped that the exhibit will be thoroughly representative. No gliding has been done, but next month should prove suitable weather. Arrangements are almost completed for the building of the full-size aeroplane. It will be of the tractor-biplane type, with a fuselage of the Blériot variety. Work will begin almost at once. Any students of aviation in the locality who would care to join in should apply to the secretary.



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Aeronautical Patents Published.

Applied for in 1912.

Published January 8th, 1914.

- 29,170. A. P. FILIPPI. Aerial or nautical propeller.

- 29,252. F. AMOORE. Aeroplanes.

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- 29,401. H. COANDA AND BRITISH AND COLONIAL AEROPLANE CO., LTD. Aeroplanes.

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- 3,470. H. T. ALESBURY. Aerial planes.

- 9,599. F. BLICHARSKI. Flying machines.

- 14,233. G. H. THOMAS. Biplanes.

- 15,488. BALLONHALLENBAU GES. Airship sheds or hangars.

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- 7,448. H. COANDA AND BRITISH AND COLONIAL AEROPLANE CO., LTD. Aeroplanes.

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